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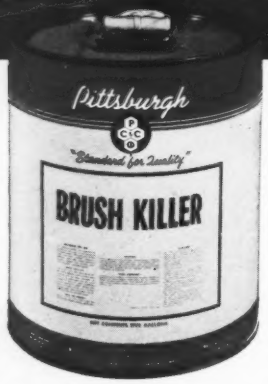

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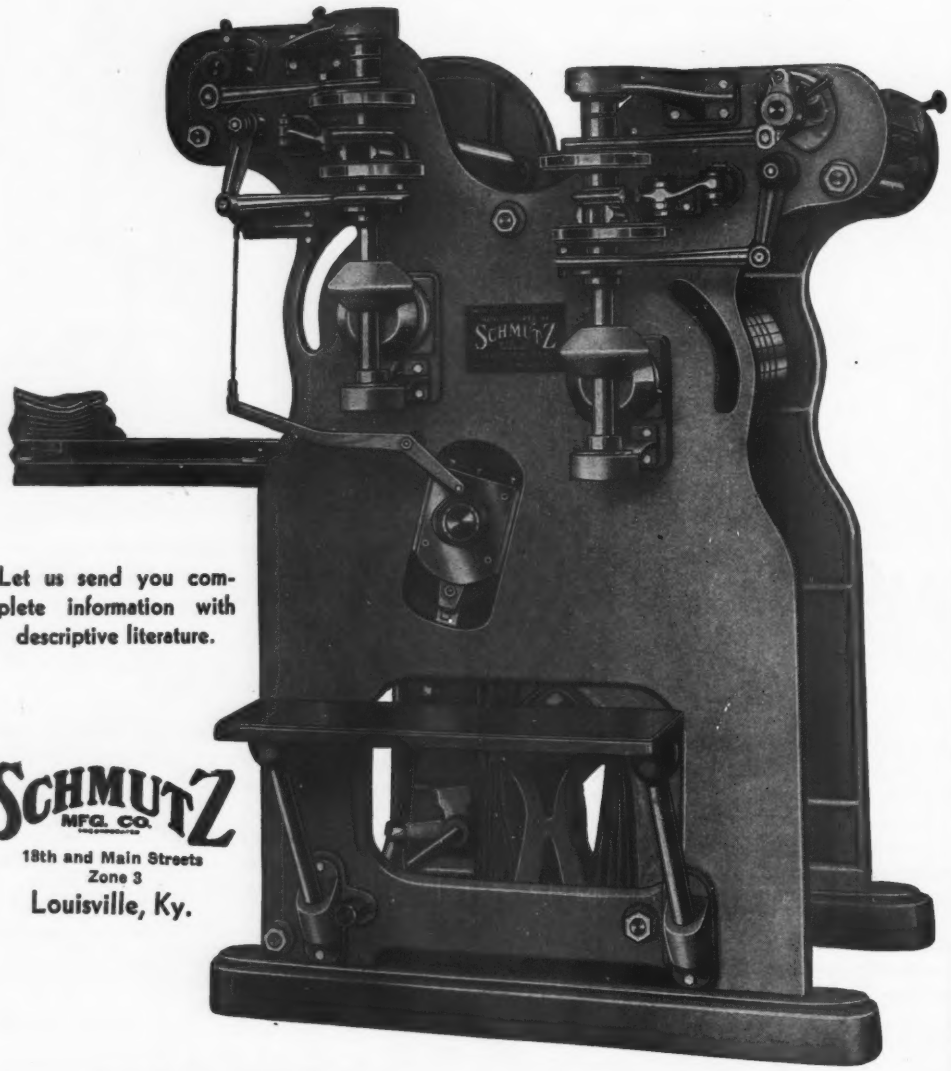

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Cover Story

By July, Brea Chemicals' 13 million dollar ammonia plant at Brea, Cal. will be producing at the rate of 235 tons per day. Ammonia and ammonia solutions will go to distribution stations in the Western states and Hawaii.

Vol. 117 MAY, 1954 No. 5

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In this issue . . .

Brea Chemicals soon will be marketing aqua ammonia from its new West Coast plant, as described in the article on pages 21–22.

At the recent NAC convention, J. A. Walker gave an interesting talk on the pesticide credit situation. His remarks are presented in the article on page 26.

USDA's supplemental fertilizer situation report for 1953–54 forecasts a possible new high in plant food tonnage. Summarized on pages 30–31.

From the advance programs, the fertilizer industry can look forward to two top-flight June conventions. See APFC on page 33 and NFA on 35.

W. T. Seney, in his article beginning page 36, states that you must know your cost factors before pricing. He shows how to set up alternative courses of pricing action.

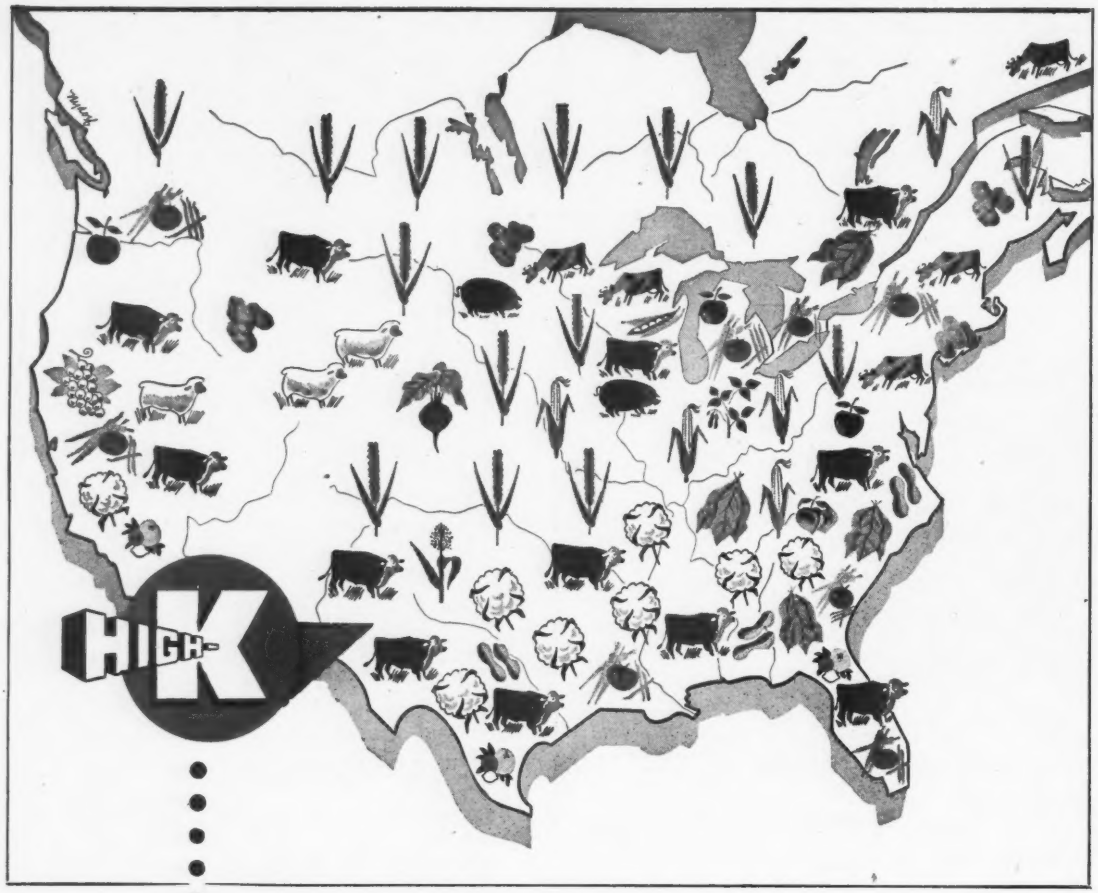
John Conner recommends that you prepare to defend your "poorest possible position" in a paper on legal aspects of research and production control, page 40.

Making guesstimates on insect losses is the subject discussed by G. C. Decker in an article beginning on page 44.

See pages 47-48 for a description of Phillips Chemical's new ammonia unit. This article was especially prepared by the company's Process Engineering division.

Hercules Powder has officially opened its agricultural chemicals research laboratory. A brief description appears on page 50.

Beginning on page 50, H. E. Myers discusses various factors and their influence on the future of the fertilizer industry.



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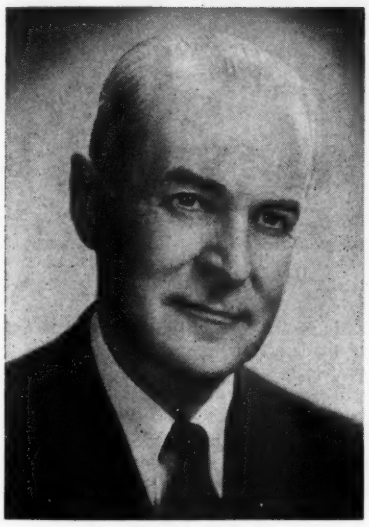
INDUSTRY News

Bear Retires As Rutgers Chairman
Succeeded by Penn State's Alderfer



Dr. Firman E. Bear

Dr. Russell B. Alderfer

Dr. Firman E. Bear, professor of agricultural chemistry and chairman of the Soils department at the New Jersey Agricultural Experiment Station, Rutgers University, will retire on June 1. He will be succeeded as chairman of the Soils department by Dr. Russell B. Alderfer.

An office will still be maintained on campus by Dr. Bear, who will continue as editor-in-chief of *Soil Science*. Immediately following his retirement, he will spend some time in South America, stopping in Peru, Chile, Argentina and Brazil.

He has been an instructor in soils and later head of the department at Ohio State University, head of the Soils department at the University of West Virginia, director of agricultural research for American Cyanamid Co., science editor of *Country Home Magazine* and author of two textbooks, *Theory and Practice in the Use of Fertilizers* and *Soils and Fertilizers*.

Dr. Alderfer, professor of soil technology at Pennsylvania State University, has conducted investigations dealing with the physical properties and management of fruit, vegetable, pasture and farm crop soils. He has been in charge of soil and water conservation investigations throughout Pennsylvania, and has authored or coauthored many agricultural experiment station bulletins and scientific journal articles.

FTC Sets Hearings on Soil Conditioner Rules

Proposed trade practice rules for the chemical soil conditioner industry were made public on April 1 by the Federal Trade Commission. Hearings on them were to be held April 23 at the U. S. Court House, Foley Square, New York City.

The commission defined a chemical soil industry product, as used under the proposed rules, as meaning any synthetic organic chemical substance or a chemically modified natural substance "which is represented as having a primary function of forming soil aggregates in soil to which it has been applied and thereby improving the resistance of such soil to the slaking action of water, increasing its water and air permeability, improving the resistance of its surface to crusting, improving its ease of cultivation and/or otherwise favorably modifying its structural or physical properties."

Western Phosphate Bed

A large bed of low-grade phosphate rock has been found in the Idaho-Wyoming phosphate region, according to reports from the Geological Survey. The bed was said to be widespread and as much as 12½ feet in thickness.

Group Inspects Bonnie IMC Phosphates Plant

An inspection tour of the new Bonnie, Fla. phosphate chemicals plant of International Minerals & Chemical Corp. was made by representatives of the Atomic Energy Commission, feed manufacturers, IMC officers and the press on April 2.

This is the first Florida plant in operation producing uranium compounds for the AEC. These materials are recovered as an intermediate step in the production of multiple superphosphate and dicalcium phosphate, according to Louis Ware, IMC president.

International expects that the 15 million dollar plant will produce 100,000 tons of dicalcium phosphate per year.

The group also visited the corporation's Noralyn phosphate mine and refinery following a luncheon at the International Pavilion and Park at Mulberry.

NFA Sales Survey

Fertilizer sales in this country for the year ending June 30, 1954 will be almost as great as those of the previous year on a tonnage basis and two to three per cent more than 1952–53 on a plant food basis, according to results of a spot-survey conducted by the National Fertilizer Association.

The association also reported that the trend toward higher analysis fertilizers apparently is continuing in all areas, and seems to be most pronounced in the West North Central and Western areas and least noticeable in the Southeast.

Texas 2, 4-D Ruling

The use of 2,4-D by aircraft, ground equipment or any other means has been prohibited in Liberty, Chambers, Harris, Fort Bend, Brazoria, Wharton and Matagorda counties, and all other herbicides used in these counties are to be used in strict compliance with the rules and regulations of the Texas Department of Agriculture, according to the amendment.

Aerial application of herbicides has been prohibited in certain areas of Liberty, Chambers, Harris and Fort Bend counties by an amendment to the Texas Herbicide Regulation No. 1 made by John C. White, commissioner, Texas Department of Agriculture.

Commissioner White announced the ban of hormone-type herbicides in his address before the National Agricultural Chemicals Association convention in Houston on March 24. (*Reported in* FARM CHEMICALS *April issue, page 22.*)

Pacific Branch, ESA Plans June Meet

By Chuck Starker

Press Chairman
Pacific Branch, ESA

Bend, Ore., has been selected by the Arrangements committee of the Pacific Branch, Entomological Society of America, as the meeting place for their second annual meeting, June 22–24. Headquarters will be the Pilot Butte Inn. Located in the heart of scenic central Oregon, Bend is well situated for access by plane or car.

In line with the celebration of the Centennial year of Professional Entomology in the United States, three of the invitational talks will be on various phases of this subject. Dr. Al Boyce, director, Citrus Experiment Station, Riverside, Cal. will speak on "One Hundred Years of Insect Control by Chemicals;" Prof. E. O. Essig, University of California, Berkeley, "Some Historical Aspects of Pacific Coast Entomology;" and Dr. H. H. Ross, president of the Entomological Society on "Our National Society in the Centennial Year."

Other invitational speakers include Dr. Ralph Macy, Reed College, Oregon, "Food Habits of Lepidoptera;" Dr. M. M., Barnes, Citrus Experiment, Riverside, Cal. "Specificity of Acaracides;" Dr. B. G. Thompson, Oregon State College, Corvallis, "An Entomologist in Iran;" Dr. E. F. Knipling, Washington, D.C., "Reorganization of the Bureau of Entomology and Plant Quarantine."

A fine program of submitted papers is assured by the program chairman, Dr. P. O. Ritcher. There will be sections on Insect Ecology, Insect Biology and the general aspects of Systemic Insecticides. Three panel discussions have been arranged on Soil Insecticides, Integration of Laboratory and Field Research and Entomology in the "Roaring Twenties." Movies on various Entomological subjects will be shown concurrently with the general paper sessions.

As a special feature of the meeting, a Buckaroo Breakfast will be served one morning during the meeting. The annual banquet will be given the night of June 23, complete with a very unique floor show. Dancing will follow the banquet. The Arrangements committee has planned an unusually attractive program for the ladies and will have tours to the many local spots of scenic beauty.

Alabama By-Products, Hercules Ammonia Plant

Alabama By-Products Corp. and Hercules Powder Co. last month announced that they were working out plans for jointly producing anhydrous ammonia in a new plant to be located in the vicinity of Birmingham. Plant capacity will be 45,000 tons annually.

The new plant will be the first commercial producer of ammonia east of Memphis, Vicksburg and New Orleans on the Mississippi and south of Virginia. Agricultural and industrial consumers in this area are expected to benefit from the new plant through lower transportation costs and increased source of supply.

To be located near Alabama By-Products Tarrant Works, construction on the plant was expected to begin within a few weeks time, and completion is scheduled for 1955.

Three Year Plan for Fertilizer Section, NSC

Looking beyond its immediate goals, the Fertilizer section, National Safety Council, is planning to develop a Three Year Plan according to Vernon S. Gornto, general chairman.

A special committtee named by Gornto to formulate the plan is composed of J. E. Smith, chairman, Spencer Chemical Co.; T. J. Clarke, GLF Soil Bldg. Service; C. A. Cox, Virginia-Carolina Chemical Corp. and F. W. High, The Baugh Chemical Co. S. A. Washburn, NSC staff representative for the Fertilizer section will serve as a special counsel to the committee.

Gornto explains that it is his idea to adopt a definite plan which will include all major objectives which the section hopes to accomplish during the three year period. The committee is to assign a priority to each of the objectives.

Smith will submit the plan recommended by his committee to the Executive committee of the section on June 13, following a meeting of the committee during the previous day. Both conferences will take place at the Greenbrier Hotel, White Sulphur Springs, W. Va.

Cominco Expanding Ammonia Facilities

A major expansion program of ammonia production facilities at the Alberta Nitrogen department of The Consolidated Mining and Smelting Co. of Canada, Ltd. has been announced by the company.

The Calgary, Alberta project will provide sufficient additional ammonia to permit full operation of Cominco's ammonium nitrate facilities at both Calgary and at Trail, B. C. It will also allow sales of substantial quantities of anhydrous ammonia.

When completed, the project will increase by more than 50,000 tons the Cominco fertilizer output. It is part of a long range chemical and fertilizer expansion program.

For several years, a company official stated, Cominco has been conducting extensive market and process research. As a part of this program, J. V. Rogers, manager, Engineering division and R. S. Woodford, general superintendent, Calgary, Alta., are now inspecting urea and other fertilizer and chemical plants in the U.S., Europe and Japan.

Pennsalt Sets Up Two Operating Divisions

Two new operating divisions—the Industrial Chemicals and Chemical Specialties divisions—will be established by Pennsylvania Salt Manufacturing Co. They will function as complete operating units responsible both for the manufacture and sale of their respective products.

"This realignment," company president George B. Beitzel announced, "will complete the company's decentralized organi-

A. H. Clem

W. P. Drake

zational structure. The change-over will be made gradually during a period of approximately a year, and most changes will be at top and middle management levels."

William P. Drake, vice president in charge of sales, was named president of the Industrial Chemicals division; Albert H. Clem, general sales manager, becomes president of the Chemical Specialties division and William F. Mitchell becomes vice president in charge of engineering, purchasing and traffic for the consolidated company.

Ill. Farm Supply Plans Tuscola Fertilizer Plant

Construction of a new fertilizer plant near Tuscola, Ill. has been authorized by the board of directors of Illinois Farm Supply Co.

To be located on a 20-acre tract of land west of the city, the plant is estimated to cost approximately $1 million. When completed and in operation, it will require about 25 employees and will produce approximately 50,000 tons of high-analysis, granular mixed fertilizers annually. Nitrogen and sulfuric acid supplies are expected to be obtained from the National Petro Chemical Co. facilities, located adjacent to Illinois' plant.

Mixer Demonstration

Guaranty Seed Co., Bunkie, La., at the request of a number of interested fertilizer manufacturers, has invited the fertilizer industry to a public demonstration of its application of the TVA funnel-mixer in the manufacture of ordinary superphosphate on Tuesday, June 1, at Bunkie. The Fertilizer Equipment Sales Corp., Atlanta, Ga., are co-hosts.

Industry Leaders Visit Trona, Cal. Facilities

More than 40 chemical industry leaders from the San Francisco area recently paid a one-day flying visit to the main plant of American Potash & Chemical Corp. at Trona, Cal.

During their visit, the officials saw how AP & C produces annually about 750,000 tons of potash, boron, soda ash, salt cake and other chemicals from brine pumped from 40 wells sunk into the bed of a dry lake.

After listening to a short talk on the geology of the lake by J. F. Phillips, associate director of research, visitors were taken on a tour of the lake bed and community. They were welcomed by Peter Colefax, company president, and were given an explanation of the unusual Trona process by G. T. Deck, plant director. A tour of the plant and research laboratory followed.

R. B. Coons, AP & C vice pres.; J. F. Smith, Dow; A. J. Anderson, Trona pl. mgr.; Peter Colefax, AP & C pres. & Jeff Meyer, Wilson & Geo. Meyer & Co.

Among the group were officials of Wilson & Geo. Meyer & Co., The Mountain Copper Co., San Jose Chemical Co., Shell Oil Co., L. H. Butcher Co., Dow Chemical Co., American Smelting & Refining Co., Standard Oil Co. of California, Monsanto Chemical Co., Diamond Alkali Co., Shell Chemical Co. and General Chemical Co.

Growth Regulator Tested

If experiments now being conducted at the University of California prove successful, the ripening of grapes may be delayed and their season extended. The findings of Robert J. Weaver, grape expert on the Davis campus, show that maturity of several varieties was "strikingly retarded" by the application of benzothiazol-2-oxyacetic acid.

More must be learned about proper concentration and wetting agent, possible change in berry keeping qualities and the best time for spraying before the treatment can be recommended, Weaver warned.

TVA Production Cut

TVA fertilizer production in 1955 will be reduced somewhat below this year's level, according to reports from TVA to the House Appropriations committee. This finished product reduction will reflect plans to sell a larger part of the plants' output as intermediate products, the report stated.

USDA Barter Contracts

USDA has announced a barter involving 1.6 million dollars worth of government owned farm commodities for 24,600 long tons of fertilizer produced in Germany, Austria and Japan. The plant food is to be used by the Corp of Engineers in civilian rehabilitation projects in South Korea.

Two of the barter contracts were between the Commodity Credit Corp. and North American Continental Co., Inc. for the exchange of 10,000 tons of German ammonium sulfate nitrate and 4,800 tons of Japanese ammonium sulfate for $1,040,000 worth of surplus farm products. A third contract, between CCC and the C. B. Fox Co. involved 9,800 long tons of Austrian calcium ammonium nitrate for about $565,000 in farm products.

Surplus commodities to be exchanged are at the option of the exporter and may be wheat, corn or other CCC-owned products available for export.

New Monsanto Furnace

Foundation work has been started by Monsanto Chemical Co. on a second furnace to double its elemental phosphorus production at Soda Springs, Ida. The multi-million dollar furnace is scheduled for completion by Nov. 15.

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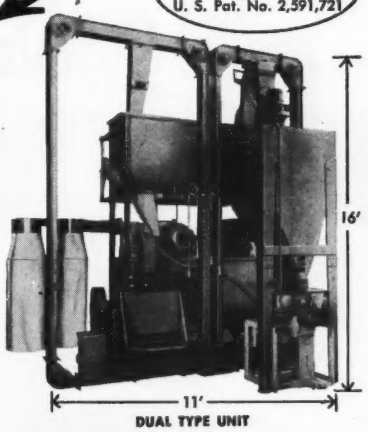

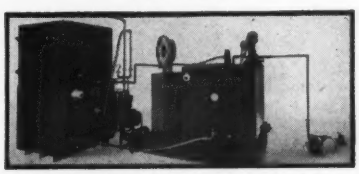

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Chemical Enterprises Buys Nine Companies

Chemical Enterprises, Inc., of New York City, has exercised an option to purchase all the outstanding stock of nine fertilizer and equipment distributing companies located in Louisiana, Texas and Washington. According to D. B. Curll, Jr., company president, the purchase price aggregated more than $1,000,000. J. C. Berry, president of Louisiana Liquid Fertilizer Co., one of the group, will be general manager of the group of affiliated companies.

The nine companies are Dixie Liquid Fertilizer Co., Inc., Monroe, La.; Louisiana Liquid Fertilizer Co., Inc., Shreveport, La.; Texammonia Gas, Inc., McAllen, Tex.; Texammonia, Inc., Elsa, Tex.; Palouse Ammonia, Inc., Endicott, Wash.; Whitman Ammonia Co., Inc., Oakesdale, Wash.; Columbia Ammonia Co., Inc., Huntsville, Wash.; Agricultural Equipment Co., Inc., Endicott, Wash., and Agricultural Wholesale Equipment Co., Shreveport, La.

Ammonia Plant Design

Detailed engineering design on Salt Lake Chemical's ammonia plant is in progress at Tears Engineers. The plant, to be located about two miles west of the Salt Lake City limits, is expected to be completed in the third quarter of 1955.

Although output will remain the same, 120 tons a day of ammonia and 30 of dry ice, several changes in processing and consumption of raw materials have been made in the original plans. Natural gas, water, steam and electric power needs have been lowered as well as the number of employees, originally 140, which is now expected to be 80.

Sulfur from Mexican Plant

Production has started at Texas International Sulphur Co.'s plant near San Felipe; Baja, Calif; Mexico, 125 miles south of the U.S. border. This plant is the only one on the North American continent now producing crude commercial sulfur from surface ore, Victor Dykes, company president announced.

The autoclave process will be used to extract crude sulfur from the ore. This is the only method which has proved successful for this purpose, the company said. Initial production of 700 tons per month can easily be doubled, according to President Dykes.

DDT for Formosan Malaria

DDT is being used to bring under control Malaria in Formosa. Prior to the start of the spraying program, there was an estimated one million cases of malaria among a total population of about 10 million. Among the 52,000 residents of the Chishan district in Southern Formosa, —the area chosen as a testing ground— whose houses were sprayed in 1952 and 1953, the malaria rate has fallen from 17 per cent to 1.5 per cent. The rate was measured by the parasite incidence in blood tests. Virtually all cases making up the 1.5 per cent were believed to be relapse cases.

Houses inhabited by about 5,400,000 persons are scheduled to be sprayed this year. The spray program was started in 1952 under joint sponsorship of the Nationalist Government, WHO and the U. S. Economic Aid Mission.

Ecuador Fert. Plant

A new plant which has been started near Quito, Ecuador, will be capable of turning out 2,000 tons of complete fertilizer per year from industrial waste products, garbage and other vegetable products, to which will be added chemical substances to complete the formula.

Only one other fertilizer plant is located in Ecuador. It produces about 1,500 tons of lime and guano phosphate per year.

Chilean Expansion Halted

Two major nitrate-producing companies in Chile, Anglo-Lautaro and Compañia Salitrera de Tarapáca & Antofagasta, have halted their future expansion plans "until the Chilean economy is decontrolled," according to recent reports. The former company was considering expansion which would cost about $14 million and the latter was contemplating an $11 million loan from the Export-Import Bank to modernize and expand.

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Company Briefs

Allied Chemical & Dye Corp. has awarded 38 Graduate Fellowships for the academic year 1954–1955. They will provide $1,500 for unmarried fellows and $2,000 for married fellows in addition to payment of tuition and will be available in 27 universities and other educational institutions in the United States and Canada.

Sales of $22,461,056 and net income of $2,116,082 for **American Potash & Chemical Corp.** in 1953 represented an increase over the $18,049,179 in sales and income of $1,670,555 reported in 1952.

The company's research budget for 1954 has been increased over 1953 when research expenditures amounted to approximately three per cent of sales.

A regional advertising and sales promotional campaign, consisting of newspaper and radio advertisements and informational folders for farmers, has been started throughout the Wenatchee-Yakima area by A P & C.

A U. S. government guaranty, protecting its investment in the Netherlands against risk of loss by expropriation has been obtained by **H. J. Baker & Bro.** Issued by the Foreign Operations Administration, the guaranty covers Baker's investment of about $9,900 in the firm of Nederlandsche Castoroliefabriek NECOF N. V., castor bean processors located in Geertruidenberg. The investment by Baker and other stockholders has enabled the Dutch firm to expand its facilities by approximately 100 per cent.

A charter has been obtained by **Cherry Chemical Co., Inc.,** of Cherryville, N. C., to deal in insecticides. Incorporators include K. C. Beam, Everett Ellington and Wade H. Stroupe. The company's authorized capital stock is $25,000.

Commercial Solvents Corp. has reduced the price of riboflavin supplements for animal feeds to seven cents per gram, based upon the riboflavin content of the supplement.

New address for the St. Louis district sales office of **Commercial Solvents Corp.** is 7890 Folk Avenue, St. Louis 17. Telephone Number: MIssion 5-3330.

Cornwell Chemical Corp., of Cornwells Heights, Pa., has completed its expansion program for sulfuric acid producing facilities according to Mark Bradley, president. This increased production capacity is said to make Cornwell one of the largest sulfuric acid plants in the Philadelphia area.

A new office has been opened in Atlanta, Ga. by the Agricultural Chemicals department of **Diamond Alkali Co.'s** Chlorinated Products division. Albert F. Fuchs, assistant sales manager, has been named to head the office, located at 463 Peachtree Building, 1401 Peachtree St., N. E.

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Federal Chemical Co., of Louisville, Ky. has been awarded a $254,800 contract by Tennessee Valley Authority for the purchase of rock phosphate.

A Key Employees' Stock Ownership Plan, designed to provide employees with additional incentive through increased opportunity to own stock has been recommended by **Freeport Sulphur Co.'s** board of directors, and was to be voted on at a recent stockholders' meeting.

The company's net earnings for the year after all charges amounted to $8,536,335 or $3.56 per share of common stock. Earnings for 1952 were $7,325,750 or $3.05 per share. Gross sales of sulfur in 1953 reached a new high, considerably above the previous record established in 1952.

Freeport Sulphur's Garden Island Bay mine has reached its announced production goal, less than three months after initial operation.

Alrose Chemical Co. has merged into its parent organization, **Geigy Chemical Corp.**, and will operate as Alrose Chemical Co., division of Geigy Chemical Corp.

Net income of **Lion Oil Co.** in 1953, after all charges, was $10,688,260 or $3.46 per share on the 3,090,890 shares outstanding at the end of the year. This is an increase of 4.67 per cent over the 1952 net income of $10,211,425 or $3.30 per share.

Sales and operating revenues reached a new high in 1953, amounting to $89,959,405 as compared with $88,625,282 for the previous year.

Negotiations are in progress for the purchase of the antifreeze operations of National Distillers Products Corp. by **Mathieson Chemical Corp.**, a Mathieson spokesman has announced.

Plant construction has been completed by **Mexican Gulf Sulphur Co.** on its San Cristobal dome, according to Paul Nachtman, president. Cris Elliott, former assistant chief engineer for Texas Gulf Sulphur Co. has been named general production manager of the Mexican sulfur company.

Ammonia production was scheduled to begin last month at the **Nitrogen division,** Allied Chemical & Dye Corp. plant at Omaha, Neb. Shortly thereafter urea production was scheduled to start.

Phillips Petroleum Co. and its subsidiaries' net income for 1953 was $76,760,231, compared with $75,284,261 in 1952. Sales of products, services and other income in 1953 amounted to $765,221,149, compared with $723,092,386 in 1952.

The company's board of directors declared a dividend of 65 cents on common stock payable March 1, 1954 to stockholders of record Feb. 5.

Pittsburgh Plate Glass Co.'s net sales were $451,964,697 for the year 1953. This represents an increase of more than 12 per cent over sales of $402,055,085 for 1952 and is an all-time high for the firm.

Net earnings for the year were $36,864,785, equivalent to $4.07 per share, as compared with $36,771,925 or $4.07 per share reported for 1952.

Rohm & Haas is constructing a plant at Scarboro, near Toronto, Canada. To be managed by Rohm & Haas of Canada, the new facilities are part of a long-term program aimed at expanding its growing Canadian business.

An additional 5,000 square feet of manufacturing and warehouse space have been acquired by **Science Products Co.** The new quarters, Science states, enable it to install additional mixing and packaging equipment to handle efficiently the increased demand for its products. Office remains at 1230 E. 63rd St., Chicago 37.

Ground has been broken by **Shea Chemical Corp.**, Baltimore, Md., for a new phosphoric acid plant at Jeffersonville, Ind. Elemental phosphorus from the company's Columbia, Tenn. plant will be converted into phosphoric acid at the new unit, which is expected to be in operation by late summer.

Southwest Potash Corp., wholly-owned subsidiary of The American Metal Co., Ltd., satisfactorily ended its first full year of operations, the parent company reported. Work on its permanent underground installations will be completed during this year. During 1953, storage facilities at the plant were increased and several small additions and improvements were made in the mill.

The subsidiary joined American Potash Institute and Potash Export Association in 1953.

Sales of **Stauffer Chemical Co.** in 1953 amounted to $76,638,000, of which $17,886,000 resulted from agricultural chemical sales. Total sales increased nine per cent over the $70,184,000 reported for 1952 and agricultural chemical sales decreased 15 per cent compared with $21,121,000 reported for 1952. Net income after taxes was $5,464,000, a 21 per cent increase over 1952 income of $4,520,000.

I. P. Thomas & Son Co. has appointed Philipp Brothers Chemicals, Inc., exclusive selling agents for its production of triple superphosphate. K. D. Morrison, Philipp's Agricultural Chemical division general manager, will direct sales of the product.

People

George S. Wheaton, assistant vice president of **American Potash & Chemical Corp.**, has been named head of the company's Eston Chemicals division, according to an announcement by Peter Colfax, president. A graduate of Stanford University, Wheaton began his chemical career with Hercules Powder Co., following which he joined Eston Chemicals, which became a division of AP & C in July, 1952.

Bemis Bro. Bag Co. has appointed D. A. Clarke assistant manager of its Indianapolis plant and Sales division, effective May 1. Former assistant sales manager of Indianapolis Sales division, W. J. Ray, has been transferred to the company's general offices in St. Louis as assistant to S. M. Spencer, supervisor of textile bag sales.

New salesman for **Chase Bag Co.** is Donald William Douglas. He will represent the company in the Stockton area and Nevada. Prior to joining Chase, he was advertising display manager for Yost Bros.

Dr. Jean G. Smith has joined the Research and Development division of **The Davison Chemical Corp.**

Diamond Alkali Co. appointments: C. A. Butler, Jr., director of engineering, has been promoted to the newly-created post of director of commercial development. Loren Scoville, since 1951 vice president in charge of engineering, purchasing and operations for Jefferson Chemical Co., has been named to take over Butler's work as director of engineering.

In the company's Chlorinated Products division, Dr. D. J. Porter was named assistant general manager and division research director; Dr. J. J. Lukes, named research manager; W. B. Beeson, Jr., product sales manager for Diamond chem-

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Box 455, Farm Chemicals Magazine

icals manufactured at the Belle plant and other chlorinated solvents; W. J. Esselstyn, solvents sales manager; M. T. Walsh, sales manager in charge of Chlorowax and related products and D. C. Nevling, divisional administrative assistant.

Fred A. Craine, assistant credit manager at Cleveland, O., has been appointed general credit manager.

Died: **Otto Diels,** 78, on March 7. He was head of the chemistry department at University of Kiel, Germany, and a joint winner of the Nobel Prize in Chemistry for 1950 with Kurt Alder. He became professor at the University in 1916 and spent the remainder of his career at that institution until his retirement several years ago.

Died: **Pierre Samuel duPont,** 84, on April 5. The duPont family head, with his two cousins, Alfred I. and T. Coleman duPont, acquired DuPont Co. at the turn of the century. Pierre duPont was a director and honorary chairman of the board at the time of his death. His philanthropies amounted to millions of dollars and were especially noteworthy in the field of education.

Dr. Oliver W. Cass, assistant laboratory manager of **DuPont Co.'s** Electrochemicals department at Niagara Falls, N. Y., whose research has contributed to the development of DDT, nylon and synthetic rubber, has won the 1954 Jacob F. Schoellkopf Medal of the American Chemical Society's Western New York section, according to an ACS announcement.

George W. Williams has been named manager of **Fulton Bag & Cotton Mills** new combined textile and multiwall operations at Los Angeles, succeeding Jack C. Baldwin, who is retiring. Newly-appointed Los Angeles sales manager is W. Frank Kerr, former sales manager at the company's New Orleans plant.

International Minerals & Chemical Corp. has named H. W. Dahlberg, Jr., assistant to Howard F. Roderick, vice president in charge of the Phosphate Chemicals division. Dahlburg has been a member of the company's Research division since 1945.

Died: Henry C. Aaron, 47, on March 25. He was district sales manager of **International Minerals & Chemical Corp.'s** Potash division's southwest territory.

George M. Walker succeeds Dan M. Rugg, who died recently, as vice president and general manager of Koppers Chemical division. His election was announced by Gen. Brehon Somervell, chairman and president of Koppers, following action by the company's board of directors. Also named a departmental vice president was Ralph Winslow, who has been manager of the company's Public Relations department since January, 1947.

Central general manager for **Link-Belt Co.'s** Pacific division is Donald E. Thal. He is responsible for general management of the Link-Belt San Francisco plant and for sales in the central area of the Pacific division. Thal joined the company in 1936 and has served in the engineering departments of its Chicago, Seattle and San Francisco plants. He attended the University of Illinois and the Massachusetts Institute of Technology.

D. E. Thal

Chairman of the board of directors of **Lummus Co.,** Carl S. Reed, has retired. He succeeded Walter E. Lummus as president of the company in 1931 shortly after its incorporation as a successor firm to The Walter E. Lummus Co. Reed has been chairman of the board since 1949.

Operation of the Malaria Control Program being conducted by the World Health Organization in Central and South America will be studied during a six-week tour of nine countries in the area by Alfred G. Raufer, sales director, **Michigan Chemical Co.**

Frank B. Stewart is new assistant general manager of the **Miller Products Co.** He is a graduate of the University of Utah, and has been with Miller for the past several years.

William R. Farrell has been appointed advertising manager for **Monsanto Chemical Co.'s** Advertising and Public Relations department, according to an announcement by Howard A. Marple, director of advertising and public relations. Concurrently, Dan J. Forrestal was named manager of public relations.

New assistant to Monsanto Chemical Co.'s president is J. P. Ekberg, Jr. Also made secretary of Monsanto's Executive and Finance committees, he replaces Philip R. Tarr, who has been transferred to the Plastics division, Springfield, Mass. K. Warren Easley succeeds Ekberg as technical representative in Washington, D. C.

Nopco Chemical Co.'s board of directors, at its annual meeting on March 25, elected Thomas A. Printon chairman of the board as well as president of the company. As chairman, he succeeds Charles P. Gulick, who was named honorary chairman of the board. Printon has been with Nopco since 1922, has served as director of the company since 1936 and as president since 1949.

T. A. Printon

Pacific Coast Borax Co. appointments: Roger W. Hinchman as eastern sales manager for the Industrial division, and Maurice H. Pickard as director of technical service and product development. Both will be located in New York.

Since joining Pacific Coast Borax in 1943, Hinchman has worked in various sales capacities, and prior to going to New York was in charge of industrial and agricultural sales in San Francisco.

Picard joined the company as chief chemist for its Boron, Cal. plant in 1936. After several years as mill superintendent there and as superintendent at Wilmington, Cal. he was transferred to the New York Sales department in 1944.

Raymond Bag Co. has announced the appointment of Henry A. Kennington as general sales manager. Prior to joining Raymond, he served as sales manager for one of Armour & Co.'s industrial divisions. During the past 16 years, he has been a territory salesman, district manager, regional manager, assistant sales manager and sales manager.

H. A. Kennington

In his present capacity, Kennington will be responsible for all activities pertaining to the sale of Raymond's complete line of multiwall paper shipping sacks to all industries.

Milton W. Melander now is Export Sales division manager of **Stauffer Chemical**

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Co., its subsidiaries and associated companies, according to an announcement by Hans Stauffer, executive vice president. Melander joined Stauffer in 1923, and has been Pacific Coast export manager since 1942. His headquarters will be in the company's New York offices.

Election of Charles B. Harding, senior partner of Smith, Barney & Co., to the board of directors of **Union Sulphur & Oil Corp.** was recently announced.

Dr. Murry C. McJunkin has been named development representative for **United States Steel Corp.** He will direct the development activities of the company in agronomy work. Primarily interested in promotion of ammonium sulfate and nitrogen bearing mixed fertilizers, Dr. McJunkin will work with experiment stations, USDA, fertilizer manufacturers and other agricultural groups. Prior to joining U. S. Steel, he had been an agronomist with Coke Oven Ammonia Research Bureau since April, 1949.

M. C. McJunkin

Promotion of Charles Hamilton Chase to general manager has been announced by **Vulcan Iron Works.** Chase succeeds R. A. Fox, who has retired but remains as a consultant to the company.

Associations & Meetings

North Central Branch ESA Proceedings Available

When entomologists of the North Central Branch, Entomological Society of America met at the Hotel Paxton, Omaha, Neb. on March 25 and 26, they were given a progress report by Dr. H. H. Ross, president, ESA, on the consolidation of that association with the American Association of Economic Entomologists. Reorganization of USDA's Bureau of Entomology and Plant Quarantine and its widespread implications in the field of economic entomology was discussed by Clarence H. Hoffman, of the bureau, and Dr. H. B. Mills, chief of the Illinois Natural History Survey division presented his views on the relationship and integration of fields within entomology. Talks were also presented by Dr. G. C. Decker, Dr. Clyde W. Kearns, Dr. B. A. Porter and Dr. C. C. Roan.

Proceedings of the meeting will soon be published, and may be obtained by placing an order or sending a remittance of $3 to Roy W. Rings, secretary-treasurer of ESA's North Central Branch at the Department of Entomology, Ohio Agricultural Experiment Station, Wooster, O.

Pest Control Meet

At a recent meeting of the National Pest Control Association at the University of Massachusetts, growing concern over resistance of pests to available pesticides was expressed by 150 professional entomologists, exterminators and representatives from USDA, Fish and Wildlife Service and the U. S. Public Health Service.

The association's executive secretary, Dr. Ralph E. Heal, told the conference of his own observations in Corpus Christi, Tex., where the German cockroach invaded the city and is still resisting efforts of exterminators and the Federal government to eradicate it.

S. C. PFES Gains 25

As a result of district meetings which it held in January, South Carolina Plant Food Educational Society reports that it has gained 25 new members. The meetings were attended by farmers, fertilizer dealers and society members.

Garden Show Dates Set

Garden Supply Merchandiser magazine has announced the following dates and locations for its 1954–55 Trade Show Series: Oakland, Cal.—Municipal Auditorium and Exposition Bldg., Sept. 19–22, 1954; Chicago--Hotel Sherman, Jan. 10–12, 1955, and New York City—71st Infantry Regiment Armory, Feb. 1–3, 1955.

Cotton Production Problems Discussed

Disease and weed control, soil fertility, insect control and defoliation were all discussed at the Third Annual Western Cotton Production Conference, held April 13–14 at the Hotel Westward Ho, Phoenix, Ariz.

Seedling diseases are causing the heaviest losses from cotton disease in the United States today, Gordon A. Brandes of Philadelphia told the group, on the first day of the meeting and "there is considerable evidence that it is feasible to make in-the-furrow applications of certain fungicides at planting time.

It was pointed out in a panel discussion that the cotton root-knot nematode has become a serious pest in the Southwest, and that an estimated 25,000 acres of the 1953 Arizona crop showed losses ranging from light to moderate. Another panel discussion, on weed control, was held.

The outlook for chemicals in weed control—as in cotton diseases—is good, said W. B. Ennis, Jr., a USDA agronomist. He added that "In order to develop sound guiding principles for the use of new chemicals, fundamental knowledge is needed on 1. how and why certain chemicals behave as herbicides, 2. the influence of soil and environmental factors on the action and behaviour of the herbicides and 3. the responsiveness of weeds and crops to different kinds of treatments."

Other speakers included W. A. Stevenson, USDA, Tucson; J. N. Roney, extension entomologist, University of Arizona; J. C. Gaines, head, entomology department, Texas A & M College; E. J. O'Neal, entomologist, Agricultural Products Co.; G. L. Smith, associate entomologist, California Extension Service; R. C. Dobson, extension entomologist, New Mexico Extension Service; N. M. Randolph, Texas A & M College; Dr. H. T. Reynolds, assistant entomologist, University of California, and W. H. Tharp, principal physiologist, Section of Cotton and Other Fiber Crops, USDA.

NFA Award Winner

A silver loving cup, signifying outstanding achievement in pasture improvement, recently was presented by the National Fertilizer Association to Westmoreland county, Va. Malcolm H. McVickar (2nd from right) NFA chief agronomist, presents the cup to James Latane, chairman of county's Pasture committee. Also shown are Dobbyns Straughn of county's Ruritan Club, G. R. Epperson, Va. Ext. Serv. agronomist and Stanley Dawson, county agent.

CCDA Elects Sommer, Presents Award to Steck

At its tenth annual meeting in March, the Commercial Chemical Development Association selected as its president, Dr. Nolan B. Sommer, of American Cyanamid Co., effective July 1. President-elect for 1954–55 is Dr. R. L. Bateman, Carbide & Carbon Chemicals Co. Dr. Bateman will take office on July 1, 1955.

CCDA's 1954 honor award was presented to L. V. Steck, marketing vice president of Shell Chemical Corp. In accepting the award, Steck remarked on the growth rate of chemical production over the last 30 years, which has been an average of nine per cent a year—about three times the average rate of the total industrial output of the country.

Other officers of CCDA for 1954–55 are treasurer, J. M. Rogers, Minnesota Mining & Manufacturing Co.; executive secretary, J. L. Dudley, Carwin Co and directors, L. E. Johnson of Mathieson Chemical Corp. and Dr. F. E. Dolian of Commercial Solvents Corp.

Lawrence Warns Market Research Group on Tariffs

Richard M. Lawrence, of Monsanto Chemical Co., warned that further downward revisions in tariffs at this time could undermine the stability of this country's economy, in a talk before the Chemical Market Research Association.

Other speakers at the CMRA meeting, held in late February at Niagara Falls, N. Y., predicted increased competition, but were generally optimistic on the longer-term outlook for demand exceeding present expanded output potentials.

In discussing hydrochloric acid, Mahlon E. Sharp of Dow Chemical Co. foresaw that "the major development in the future utilization of hydrochloric acid will probably be in its use as a source of chlorine." C. E. Lisman, of Hooker Electrochemical Co., spoke on the supply-demand situation in chlorine; H. R. Tennant of U. S. Industrial Chemicals Co., on the production of metallic sodium and its potential applications for the future, and R. Mattair, of Oldbury Electro-Chemical Co., discussed sodium and potassium chlorates.

Basic Materials Meet

Hundreds of new uses for materials used in products manufactured by the nation's industrial plants will be considered and discussed at the second Basic Materials Conference, to be held at International Amphitheatre, Chicago, concurrently with the Basic Materials Exposition, May 17–20, according to Clapp and Poliak, Inc., producers of the events.

With principal emphasis on development of new products, the show and conference are expected to attract more than 10,000 product designers, project engineers, production experts, research men, sales and marketing executives, as well as top management, the company said.

New Cotton Mech. Dates

Dates for the 1954 Beltwide Cotton Mechanization Conference in Little Rock have been changed from July 21–23 to July 28–30, the National Cotton Council's Production and Marketing division recently announced.

Fertiliser Society Papers

At the general meeting of the Fertiliser Society (of England) on March 25, papers were presented on "Some Legal Aspects of the Fertilisers and Feeding Stuffs Act," by J. D. Westlake, and "Some Effects of the Act on Fertiliser Manufacturers" by J. Manning.

Equipment & Supplies

Low Cost Link-Belt Ball Bearing Pillow Blocks

Its new, low-cost, ball bearing pillow blocks with pressed steel housings are designed for applications where speeds are relatively low and loads are light, reports Link-Belt Co. Combining strength and light weight, the manufacturer says the housings permit a cost reduction which makes these the economical units for light duty applications.

More Dodge Sprockets

Dodge Manufacturing Corp. has extended its "off-the-shelf" line of Taper-Lock sprockets to include 1½ inch, 1¾ inch and 2 inch pitch sizes. Taper-Lock sprockets are compact, having no flanges nor protruding parts, and occupy no more space on the shaft than ordinary sprockets, according to Dodge.

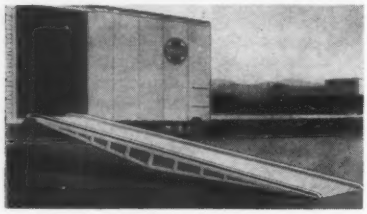
New Power-Curve Unit

A power operated headstand has been added to the flexible box car loader of Power-Curve Conveyor Co. Especially designed for continuous loading of bags, the loader is able to discharge at any height from 3½ to 6½ feet.

Chief feature of the car loader, the manufacturer says, is complete flexibility from end to end while in operation. It is self-propelled, self-retracting and reversible.

Penco Yard Ramp

To meet the need for mobile loading docks, Penco Engineering Co. has produced a magnesium yard ramp called a "movable loading dock" which can be placed where and when you want it by



Penco Ramp

one-man operation. Sturdily built of light-weight magnesium raised diamond surface plate, it was made for rugged high-speed materials handling with every degree of safety to operators and equipment, the company says.

The ramp is made in two sizes, 60 and 70 inches wide, and in six capacities from 4,000 to 16,000 pounds, with either fixed wheels or hydraulic lift. It is adjustable within 38 to 55 inch range.

New Fischbein Closer

Production of the new Model "C" Fischbein Portable Bag Closer has been announced by Dave Fischbein Co. Adaptable to a wider range of bags, it handles all paper bags including five and six ply multi-wall gusseted types, as well as all textile bags with or without asphalt lamination.

One of the many new construction features, the company states, is an easy operating trigger-style switch which has effortless trigger action starting and an automatic stop.

Piper Spray-Dust Plane

The Piper PA-18-A is the first applicator airplane to be built in quantity with factory-designed and installed dispersal equipment as an integral part of the airplane, Piper Aircraft Corp. states.

As a duster, sprayer or combination unit, the company claims the PA-18-A

Piper PA-18-A

has many features and improvements for safer, more efficient and economical aerial application.

The large capacity tank holds 110 gallons of liquid or 18 cubic feet of dust; floating booms swing back and up if they hit ground objects, reducing possibility of damage to dispersal equipment and plane; and the slotted venturi, with double gates and lateral dispersal plates was developed after very extensive testing and study of existing types. Pilot safety features include very heavy safety belt and shoulder harness and excellent forward visibility.

Piper says the plan's advantages include lowest cost per acre, dependability, quick conversion for both dust and spray and spectacular performance.

Loading Platform Bumper

A new shock-absorbing bumper, introduced by a California firm, offers a practical, low-cost solution to the problem of damaged wood facing boards on truck loading platforms, DuPont Co. reports. Mounted in continuous strips along the dock, the bumper eliminates scraping and gouging and prevents cracking from all but the most severe collisions.

It is made of neoprene synthetic rubber to assure long life under a broad range of rugged service conditions.

Fulton Multiwall Tips

Fulton Bag and Cotton Mills has prepared a booklet which outlines a series of helpful tips concerning the care and storage of its multiwall paper bags. Hints are provided on the use of steam pipe valves, water barrel wicks, windows, hoses and water pipe holes in humidity controls, inventory rotation and the "do's and don'ts" of bag handling.

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New Features for Clark Towing Tractor Line

New features which provide greater driving safety, comfort and simplicity have been incorporated in the re-designed Clarkette 5 line of general utility towing tractors, according to its manufacturer, Clark Equipment Co. Although basic dimensions of this 500-pound drawbar pull capacity have been retained, the driver platform has been lengthened and brake pedal relocated to provide more room for the operator without affecting the turning radius and the interselecting dimensions.

The control lever has been altered to reduce hand fatigue, the center control linkage has been moved to a lower cross bar and the exhaust pipe has been relocated at the right front side of the truck.

S-A Enclosed Roller Type Hold-Back Unit

The S-A Enclosed Roller Type Hold-Back is designed to prevent reversal of bucket elevators and inclined conveyors because of power failure under load, Stephens-Adamson Mfg. Co. reports. The hold-back mounts directly on the drive shaft and consists of an inner member with wedge pockets for six hardened rollers which rotates with the shaft. When the shaft attempts to reverse, the rollers wedge against an outer cylinder. Pressure springs and plungers guarantee instant engagement of the rollers. The hold-back releases instantly when forward motion of the shaft is resumed.

Broyhill Liquid N Sprayer

An all-purpose farm sprayer designed to apply liquid nitrogen solutions (non-pressure type) and for weed and insect control has been developed by the Broyhill Co. Called Model 3 FBT-1, the sprayer can be mounted either on a rugged Broyhill trailer or on the tractor itself.

The sprayer's aluminum tank has a capacity of approximately 220 gallons and is resistant to corrosion. An eight-way aluminum control valve makes possible shut-off or turn-on on all or any portion of the three section booms. The 21-foot aluminum spray booms are folded when traveling and have 13 nozzles at 20 inch spacing.

A specially designed hypro pump which will handle all farm chemicals up to 300 pounds pressure is mounted direct to the tractor power take-off. Engine-powered pump units also are available.

Y & T Electric Fork Truck

An electric fork truck which operates easily in a seven foot aisle and can pick up and deposit loads without straddling pallets or skids has been developed by Yale & Towne Manufacturing Co., according to a recent announcement.

The truck, called the Warehouser Extend-A-Load, has 2,000 pound capacity at 24 inch load center. Capable of extremely short radius turns, it can reach out and pick up or deposit a load at any height from floor level to 126 inches.

Pulva's Com-Bin Feeder Now Used as Crusher

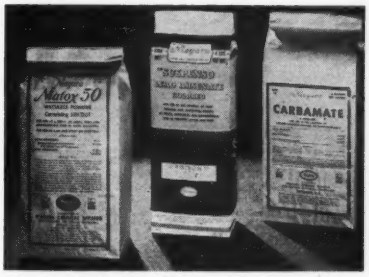
Pulva Corp.'s Com-Bin Feeder now has a new function—that of a crusher. Its primary function in the past has been to provide storage or surge bin capacity as well as operation as a feeder to meter out at controlled rates difficult-to-feed materials.

This new application offers many advantages, including elimination of difficulties previously encountered because of bridging or log jamming of the product from the sintering machine, provision for surge bin capacity, uniform controlled flow from the feeder and elimination of any pre-crushing operation because it prepares the material for the final grinding operation.

New Union Siftproof Duplex Pesticide Bag

A specially constructed duplex siftproof bag with an automatic type of bottom construction is now available to insecticide manufacturers. Union Bag & Paper Corp., which developed this bag, reports that it meets all ICC requirements for shipments of insecticides.

Advantages of the package over the more conventional types, the company



Niagara Chemical division, Food Machinery and Dye Corp., uses the new Union bags to package its Niatox 50, Suspenso Lead Arsenate & Carbamate.

states, lie in its flat bottom construction. Easier to open and square out, the bags will stand up during conveyor belt packing. Their bottom construction also makes them easier to display at the retail level. Available in sizes from three to seven pound capacity, the bags can be printed up to four colors.

Henry Ammonia Relief Valve Demonstration

Henry Valve Co.'s ammonia relief valve cycled a total of 6,902 times during a demonstration at the recent Agricultural Ammonia Institute Convention in St. Louis. There were no variations in the predetermined pressure at which the valve opened and closed. This unusual record, according to company officials, results from the exclusive controlled cushioned seat disc incorporated in the valve.

Improved Label Hopper

An improved label hopper has been added to the Amsco Automatic Hi-Speed Jaw Bag Sealer, enabling rapid change-over to different width labels. The label device, which accommodates labels from 2½ to 8 inches wide, operates by a simple handscrew adjustment which simultaneously centers the label in relation to the sealing jaws while readjusting the width of the hopper, Amsco Packaging Machinery, Inc., states.

Labeling and sealing are done in a single operation in the sealer, which can be fed either manually or by conveyor.

Suppliers' News

Steel erection has been started on **Clark Equipment Co.'s** new manufacturing plant located on a 100-acre tract of land near Benton Harbor, Mich. The Austin Co. has been awarded the contract for design, engineering and construction of the facilities.

A fellowship for graduate study in the fields of metallurgical, chemical and sanitary engineering has been established by **The Dorr Co.** to commemorate the golden jubilee of Dr. John Van Nostrand Dorr's invention of the Dorr classifier.

First Machinery Corp. has moved from 157 Hudson St., New York City, to 209–289 Tenth St., Brooklyn, effective **May 1.**

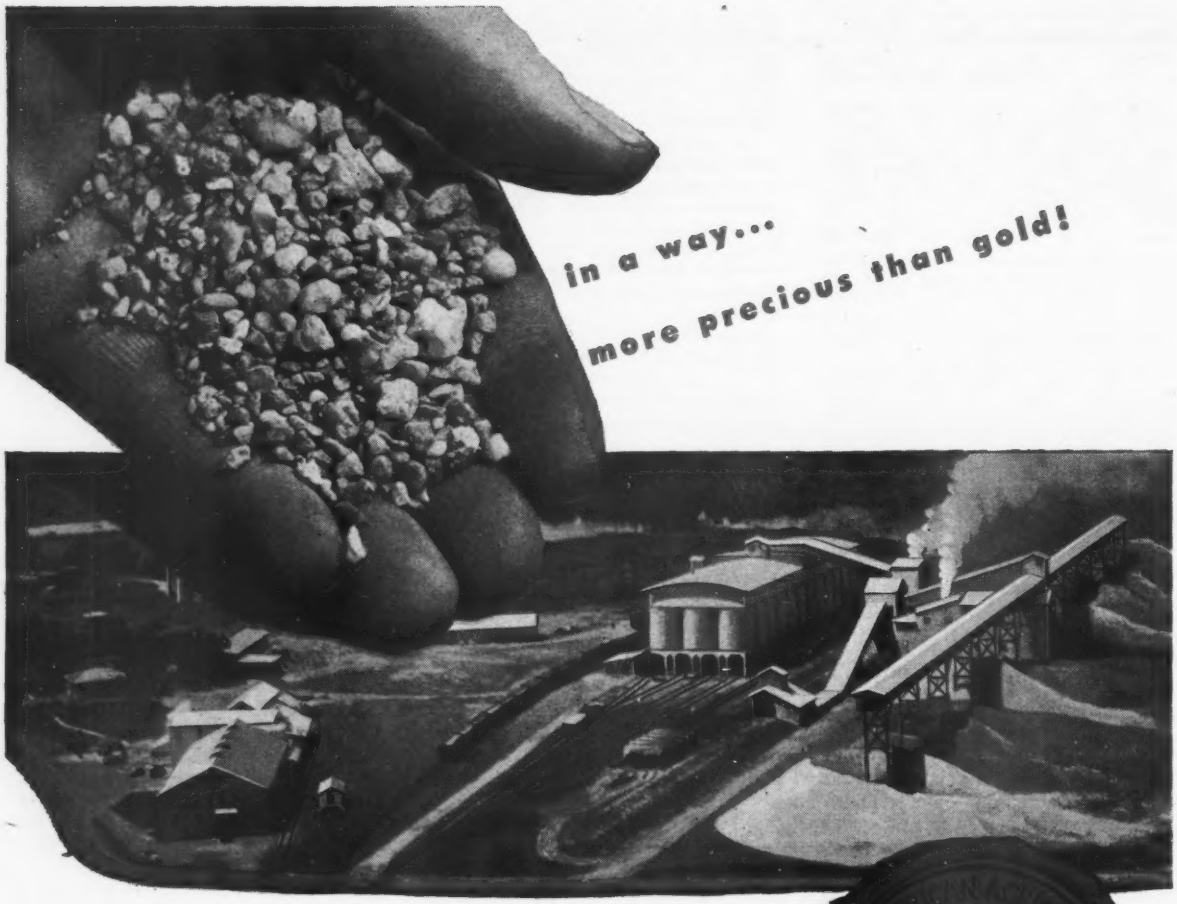
Extension of **International Paper Co.'s** stock option plan for key employees to include officers and employees of Canadian and other foreign subsidiaries, will be proposed at the company's annual meeting in New York City on May 12.

Net income of **St. Regis Paper Co.** for the first quarter of 1954 amounted to $3,949,456, equal to 70 cents a share on the 5,397,657 shares of common stock outstanding at the end of that period. This compares with $3,760,587 income or 70 cents a share on 5,170,714 shares outstanding for the first quarter of 1953.

Net sales in the first three months of this year totalled $50,094,966 compared with $49,199,222 in the comparable period last year.

Wheelabrator Foundation, Inc., sponsored by American Wheelabrator & Equipment Corp., will award college scholarships annually to sons of Wheelabrator employees and to male Wheelabrator employees. One scholarship each to Purdue and Notre Dame will be awarded each year, with initial awards and annual renewals thereafter in the sum of $650.

The Yale Road Show—world's first travelling materials handling show—last month rounded out 25,000 miles covering 30 states in its first year on the road. The second year of **Yale & Towne's** tour began with a special performance at Kelly Air Force Base, San Antonio, Tex.



Air view showing dryers and rock storage at Pierce, Florida, headquarters of A.A.C. phosphate mining operations. (Top) Sample of Florida Pebble Phosphate Rock, source of phosphorus widely used in the chemical industries, in its elemental form as well as in phosphoric acid, phosphates and phosphorus compounds. Q. This pebble rock is also the principal source of the most important—and most generally deficient—plant food element. Often called the Key to Life, phosphorus is essential in maintaining and improving crop yields. Health, growth, life itself, would be impossible without phosphorus . . . so in a way these phosphate pebbles are more precious than gold.

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All grades of Complete Fertilizers — Superphosphate
Gelatin — Bone Products — Salt Cake — Ammonium Carbonate
Sulphuric Acid — Fluosilicates — Insecticides and Fungicides
Phosphoric Acid and Phosphates — Phosphorus and Compounds of Phosphorus

THE AMERICAN AGRICULTURAL CHEMICAL COMPANY

GENERAL OFFICE: 50 CHURCH STREET, NEW YORK 7, N.Y.

33 FACTORIES AND SALES OFFICES, SERVING U.S., CANADA AND CUBA—ASSURE DEPENDABLE SERVICE

Washington Report

By Fred Bailey & John Harms

Don't be misled by various surveys indicating that plant food use will be higher this year. Drought and subsoil moisture shortages in vast areas of the farm area could play hob with predictions based on current conditions.

Recent Agriculture department and National Fertilizer Association surveys agree that consumption of fertilizer, on a plant food basis, may go up two to three per cent from 1952–53. But NFA warns that this could be changed "significantly" if farm land dryness worsens. For firmer idea of the outlook, watch for USDA's May 10 estimate of crop condition.

Both surveys also indicate that the trend toward higher analysis fertilizers is continuing. This would indicate that while total tonnage of fertilizer materials may be lower this year . . . tonnage of plant nutrients used may top last year's record. It's significant to note that USDA's forecast is based on available plant nutrients, while NFA's conclusions were drawn on the basis of a spot-check of members.

USDA's spring forecast backs off considerably from its November estimate for an 11 per cent increase in primary plant nutrients available. Reason is the slowness with which the spring movement got under way.

The department now forecasts new totals of 1,916,000 tons of contained nitrogen, boost of 6.2 per cent; 2,325,000 tons of available phosphoric oxide, drop of 3.7 per cent, and 1,830,000 tons of potassium oxide, up 5.2 per cent.

Miller pesticide tolerance bill now is expected to receive action in the Senate sometime in June. Approved by unanimous consent of the House in April, the bill was sent to the Senate Public Welfare committee. Miller bill and companion S 2868 by Sen. Aiken will be taken up sometime after the Administration's health program has cleared the committee this month.

Look for trade practice regulations for chemical soil conditioners to be announced in the next few weeks by the Federal Trade Commission . . . following the April 23 hearings in New York.

One of the main proposals for the new regulations would make it an unfair trade practice to claim: A product will be beneficial to all types and kinds of soil . . . is a significant substitute for plant nutrients . . . a complete substitute for peat moss and other organic materials . . . will effect a material modification of soil texture . . . or will have a permanent conditioning effect upon soil.

FTC definition of a chemical soil conditioner under the proposed regulations is any chemical or chemically modified substance: ". . . which is represented as having a primary function of forming soil aggregates in soil to which it has been applied and thereby improving the resistance of such soil to the slaking action of water, increasing its water and air permeability, improving ease of soil cultivation, and/or otherwise favorably modifying its structural properties."

The rules cover these general classes of deception and misrepresentation in sales: misleading guarantees, fictitious price lists, product substitution, defamation of competitors, trade-mark imitation, misrepresenting the character of business, procurement of competitor's confidential information, selling below cost, prohibited discrimination, unlawful price-fixing and aiding unfair trade practices.

Farm production this year again will be huge . . . despite the government's efforts

to cut down. Farmers plan to grow crops on about 356 million acres in 1954, only 3 million acres less than last year. Government control programs were aimed at shifting as many as 15 million acres out of crops and into conservation. Officials make no bones about their disappointment.

While control programs are forcing shifts away from wheat, corn and cotton, farmers intend to plant 11 million acres more to other cash grains—much to the consternation of the bureaucrats. If the crops turn out as farmers plan, according to a recent survey, the Agriculture department will be stuck with surplus headaches not only in corn, wheat and cotton this year, but in oats, barley, sorghums, soybeans and flax. From all indications, farmers generally don't plan on cutting corn plantings 18 per cent as requested by Secretary Benson, but only about 12 per cent.

Cotton planting estimates by the Agriculture department for 1954 won't be available until July. But unofficial surveys indicate that farmers plan to abide by the control program and cut almost four million acres from last year's plantings. Potato output also will be cut this year, but most other crops will be kept at past levels or increased.

Watch for new developments on the Federal farm research and education fronts. Both research and education, in the year beginning July 1, are to get one of the biggest budget increases from Congress in recent years. Upshot is that the Agriculture department will spend more money on research both at Washington and in the states . . . and provide more extension personnel to get results of research to the farmer.

Here are the highlights of the USDA appropriations bill as approved by the House: For research, total of $92.5 million, $15 million more than is available this year. For farmer education, extension, total of $48 million, $13 million more than available in the current year.

In the new budget, Secretary Benson got considerably more than he had requested. He recommended a cut in funds for so-called "action" programs, but sought increased funds for research and education. The House Appropriations committee cut down on his request for more research and education funds and proposed to restore Benson cuts in action programs. The House subsequently approved the increases in action programs, but brought research and education funds back up in line with Benson recommendations.

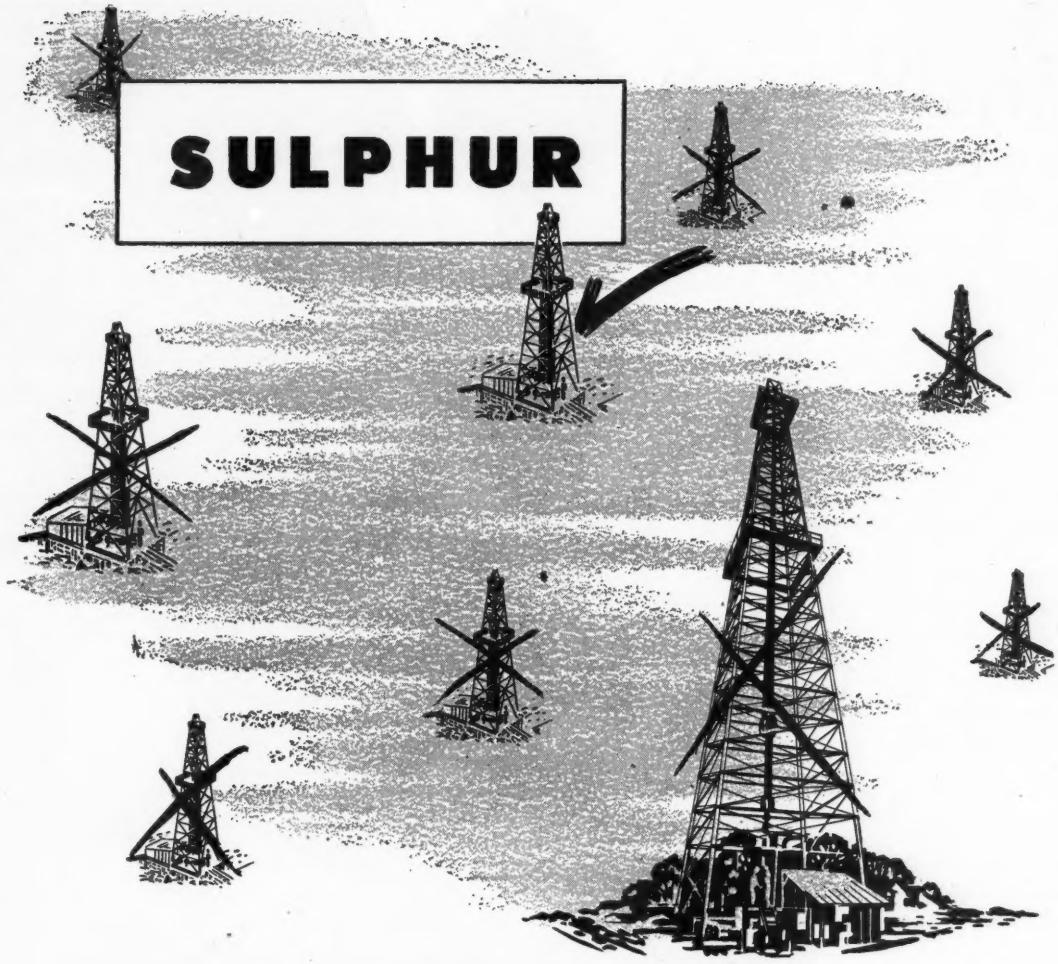
Finally, the House approved a USDA appropriation which broke the ceiling put on the department's budget by the Budget Bureau—a rare occurrence. The Administration had sought a budget of $1.1 billion for agriculture, but the House added $21 million to it. The Senate is not expected to change this in any great respect.

Farmers are to get payments for diverting acres from cash crops such as corn, wheat and cotton into soil-conserving or soil-building practices. The new budget sets aside $55 million for such a program, with a congressional promise of more after a program is developed. These payments will be made for acres diverted during the 1955 crop production season, according to present indications.

Here's what the House Appropriations committee says on the proposed program:

"The committee realizes the importance of establishing good soil conserving practices on land taken out of production under such a diverted acreage program . . . special attention should be given under the Agricultural Conservation Program. The sum of $55 million is entirely inadequate . . . and will have to be supplemented when the final program is developed."

Secretary Benson finds himself in hot water once again . . . despite the fact that he got more than he asked on the budget. White House insiders make no bones about their concern over Benson tactics. Talk is that Benson goes his own way on too many critical situations . . . then goes to the White House for help when the going gets rough. Case in point, according to these insiders, is that Benson had to resort to White House pressure to get increases in research money when it looked like Congress was going to cut it hard.



. . . producing Dome Sulphur is a *Chancey* business

"What is the cost?," is a constant and persistent query in the minds of managers whether operating a manufacturing plant or a mine.

When erecting a manufacturing plant the manager selects his location in regard to transportation of raw materials to the plant and distribution of the finished goods. On the other hand, a mine is found where nature has placed the ore and production must be in that locality.

In the case of production of sulphur by the Frasch Process, the ore lies 500 to 2500 feet below the earth's surface where nature made the underground formation. No engineer can see producing conditions.

Because of variations in formations, some sulphur mines produce efficiently and cheaply. Cost of production and marketing compared with the price determines whether the sulphur is commercially available.

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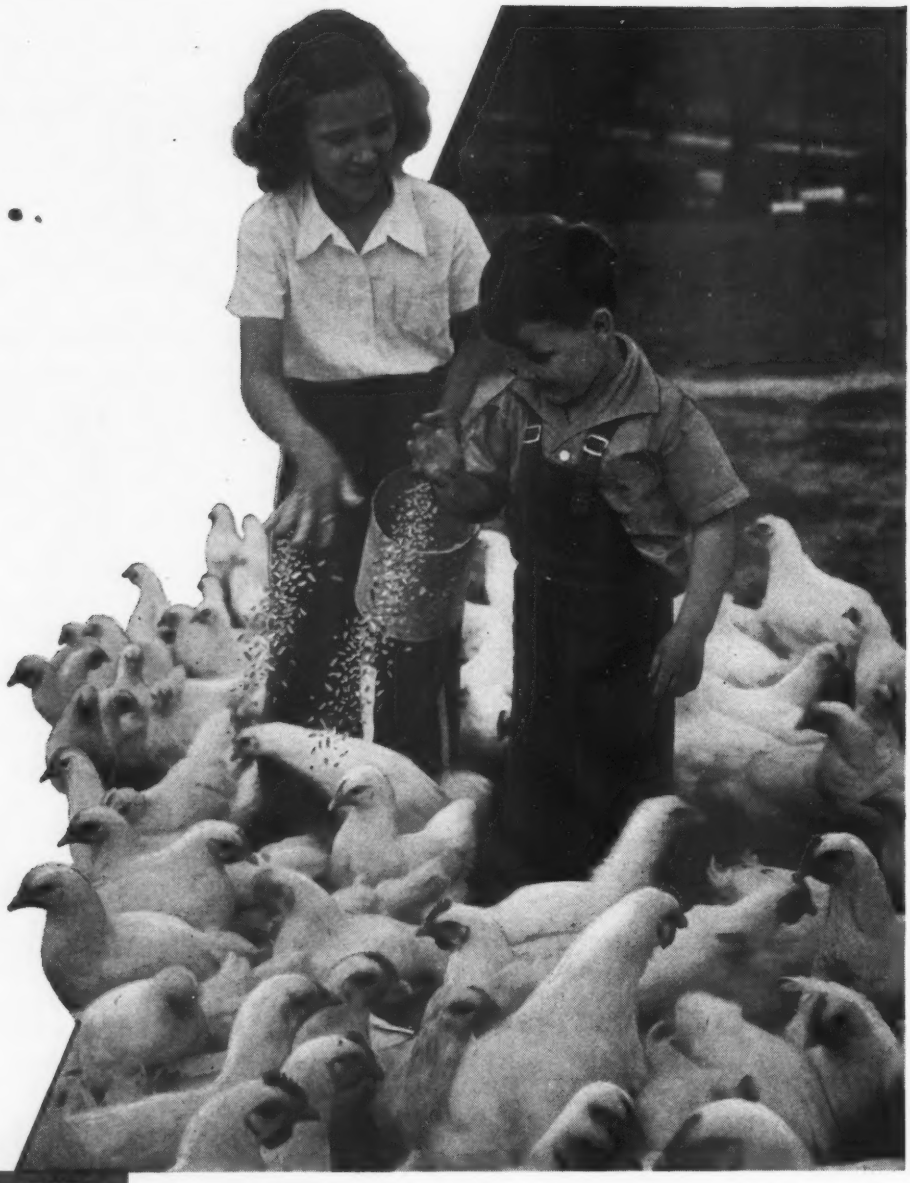
CHEMICAL PROGRESS WEEK-MAY 17-22



IT'S CHICKEN FEED

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A PRODUCT OF NEW MEXICO U.S.A.
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HIGRADE MURIATE OF POTASH 62/63% K_2O
GRANULAR MURIATE OF POTASH 60% K_2O MIN.

Southern Sales Office
Rhodes-Haverty Building, Atlanta, Georgia

It's jam-packed with nourishment value that fattens broilers and fryers quickly, and keeps egg production high. Feeds like these are grown in rich, well-fertilized soil.

Potash, a particularly effective component of modern commercial fertilizers, not only enriches the soil, but improves crop resistance to disease, producing healthier crops and larger yields.

In the mixing of these fertilizers, potash produced by the United States Potash Company has two distinct advantages. It has the highest K_2O content and is free-flowing and non-caking—important factors in fertilizer production.

Potash, as an investment, amounts to hardly more than "chicken feed"—yet pays rich dividends all through the agricultural economy.

UNITED STATES POTASH COMPANY INCORPORATED
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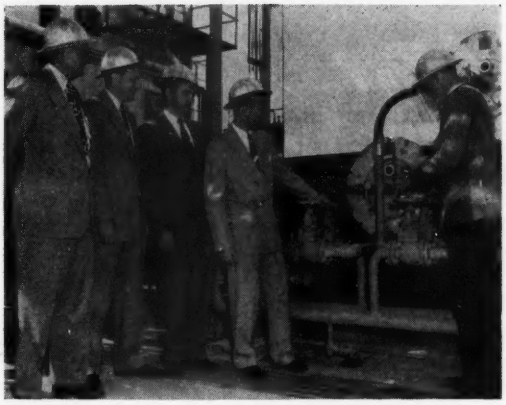
NEW YORK 20, N. Y.

Boilers Fired at Brea Plant

West Coast Unit Slated for Capacity Production in July



Homer Reed, pres.; R. S. Ogilvie, plant supt.; R. S. Ray, mgr. of mfg.; Jack Tielrooy, mgr. of development, and H. C. Stover, operator, light first boiler.

Firing of the boilers at a special press preview marked the startup of Brea Chemicals, Inc.'s new 13 million dollar ammonia plant at Brea, Cal. Homer Reed, Brea president, presided over the ceremonies and stated that the plant should be producing 235 tons per day by June and is expected to be in full production early in July.

Brea, a subsidiary of Union Oil Co. of Cal., will operate the facilities under a long term lease arrangement with The Amoniaco Corp. of Del., owners and constructors of the plant. The company will be the first major ammonia producer, Reed explained, to market its product in aqua form.

Marketed on Coast & Hawaii

H. R. Fifer, vice president in charge of marketing, told these attending the preview that the Pacific Coast area and Hawaii will serve as the initial marketing area for Brea's branded product. Ammonia will be marketed to consumers through independent dealer organizations.

Brea will maintain and operate 12 major distribution stations, Fifer continued, at sites in California, Oregon, Washington and Hawaii, with a total storage capacity of nearly 12 million gallons.

From the distribution stations, aqua ammonia will be delivered to Brea dealers or dealers' customers who are equipped to receive the product in truck and trailer lots.

The program, Fifer stated, is already in progress in the Hawaiian Islands and at other selected points within the company's marketing area. At present it is purchasing ammonia from other sources for its Hawaiian operation, where aqua ammonia is now widely used on sugar cane plantations.

Reasons for Aqua

Reasons for choosing aqua ammonia, as outlined by Fifer, include these considerations:

An easy, safe and economical system of handling agricultural nitrogen from producer to customer is provided.

It assists in solution of a difficult inventory problem facing any major producer of farm chemicals because of highly seasonal use of fertilizers.

Homer Reed (right) Brea pres.; (l to r) Jack Tielrooy, mgr. of dev.; R. S. Ray, mgr. of mfg.; H. R. Fifer, vice pres., mktg., and Paul Foreman, mgr. of staff.

Nurse-truck carrying a supply of 1,200 gallons of Brea aqua ammonia makes short work of refilling trailer unit.

Below: Leg-tanks take strain out of delivery when the truck shown just drives out from under a 500-gal. tank.

Equal or greater customer return per dollar of nitrogen investment is provided.

Existent, standard transportation facilities are utilized.

It is less dependent on variable farming conditions to obtain better results.

It affords promise of being able to combine other plant nutrients or soil conditioners in one-solution form to provide an agricultural product on a competitive basis.

Plant Tour and Demonstration

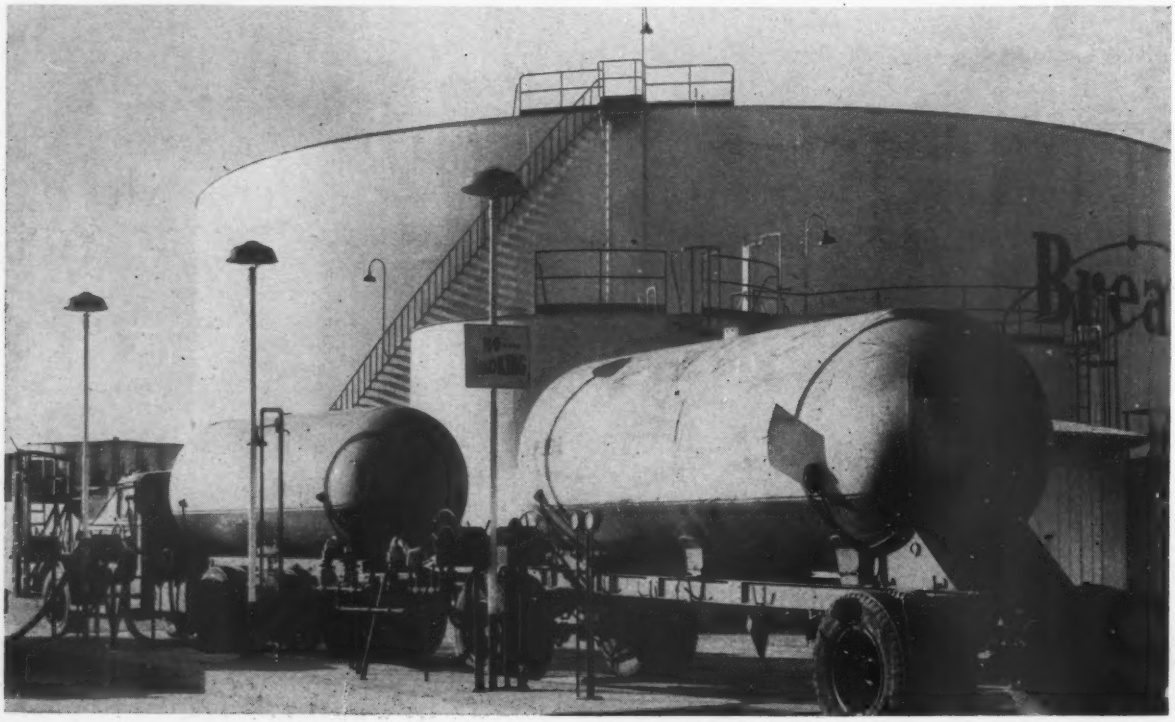
The press group was taken on a tour of the plant by Robert S. Ray, manager of manufacturing. It is located on a 30 acre site three miles east of Brea. A demonstration of the equipment used in application of aqua ammonia was carried out by members of the Brea Agricultural Technical Service.

This is the first major manufacturing operation of the Union Oil Co. subsidiary. A carbon dioxide plant is already under construction adjacent to the ammonia facilities and an engineering contract has been awarded for a 2.5 million dollar nitric acid and ammonium nitrate plant.

Brea is now marketing, from other facilities of the parent company, methyl and ethyl mercaptans, sulfur and ammonium sulfate. It was established to create a chemical business utilizing raw materials available through the parent company and to market chemicals being produced by Union Oil.

The head office is located at 714 W. Olympic Blvd., Los Angeles 15, Cal. ◆

Wilmington, Cal. conversion and storage station. Twelve stations in principal growing areas of the West give Brea point-of-use storage of more than 20 million gal. Aqua ammonia can be stored in ordinary covered tanks.



The Farm Chemicals Credit Situation

By J. A. Walker
General Credit Manager
Standard Oil Co. of California

As I look back over the rather astonishing progress of the farm chemicals industry—which, to my mind, is an epoch in American enterprise—I am particularly impressed by one thing. It is the way you have created your own opportunities through a positive approach to the situations you have faced.

In discussing the credit situation in your industry, I should like to use the same kind of positive approach. What I hope to do is explore this subject in terms of the credit opportunities in your industry. My purpose is to discuss some basic considerations in the administration of credit, particularly from the standpoint of policies and objectives.

There are many things happening in your industry which recall the earlier days of the oil business. I believe that almost every industry goes through a similar period. Perhaps I can pass on some of the experience of my own industry.

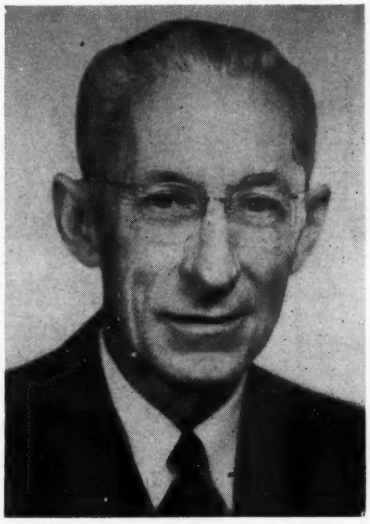
Special Concessions

During times of rapid expansion, when an industry springs from birth to thriving adulthood in a few short years, it is easy to lose sight of long range objectives. Decisions are often made in haste to fit situations as they arise. Sometimes these situations are not those which you would desire to continue without some correction.

From a talk presented at the Spring Meeting of the National Agricultural Chemicals Association, Houston, Tex., March 24, 1954.

For example, in the eagerness to secure new business there is often a strong temptation to grant special concessions to certain customers. Frequently, these concessions take the form of lengthened credit terms, such as seasonal credit or a disregard for any stated terms.

At the time they are made, these special concessions may seem harmless, but in them are the seeds of much future trouble. I have had experience with special



J. A. Walker

credit terms. I can assure you that they are contagious and, if continued, will break down the term structure in any industry. What they do in effect is to give special privileges to certain classes of customers. It often amounts to financing them in their operations, and companies which adopt such practices will end up performing a banking function without benefit of interest or security.

The treacherous thing about such practices is that there are usually no anchors to prevent you from drifting aimlessly into the sea of finance. Those who have extended seasonal credit can testify, I am sure, that what was meant to be credit for three or four months has been stretched in many instances to twelve months.

Under such conditions, and especially during periods of recession, the supplier will often be at the mercy of a customer who owes him a sizable unsecured balance. If the customer is an imaginative fellow, he can play the tune while the supplier dances. It is not uncommon either for a salesman to occasionally use his imagination and join the orchestra to pressure his company to meet or better unconfirmed competitive offers. Such competition in credit terms with each supplier trying to outbid the real or imagined offer of a competitor leads only to financial loss for all.

'Hit or Miss'

Without a sound policy to govern credit and sales people, credit operations become a matter of hit or miss. Unless you are careful you can be caught in a vicious cycle of favoritism and recrimination. Eventually, management must make a choice between doing business by expediency or by policy.

The credit policies of many oil companies were born of such conditions. In our industry, it took a depression and shortages of operating capital to establish sound credit policies and to destroy the illusions we had about such practices as seasonal credit.

I cannot stress too strongly the importance of a sound credit policy. Nor can I stress too strongly the importance of putting that policy into writing. It is the cornerstone upon which all credit decisions should be based, and yet it is

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sic plant foods,
many years now the standards
fine fertilizer ingredients,
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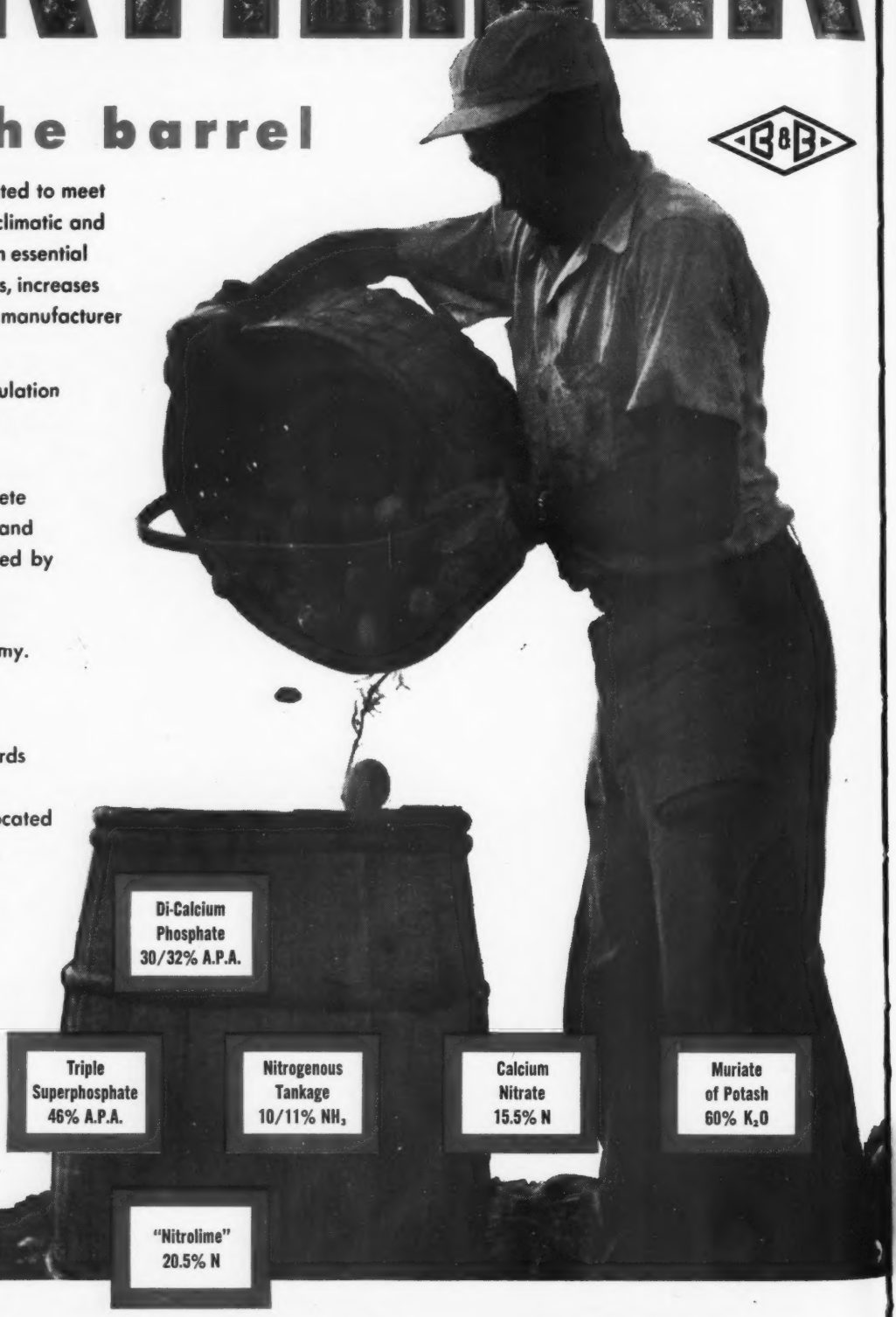
PRODUCTS:


Di-Calcium Phosphate 30/32% A.P.A.
Triple Superphosphate 46% A.P.A.
Nitrogenous Tankage 10/11% NH_3
Calcium Nitrate 15.5% N
Muriate of Potash 60% K_2O
"Nitrolime" 20.5% N

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onneville, Ltd., Wendover, Utah
entraal Stikstof Verkoopkantoor,
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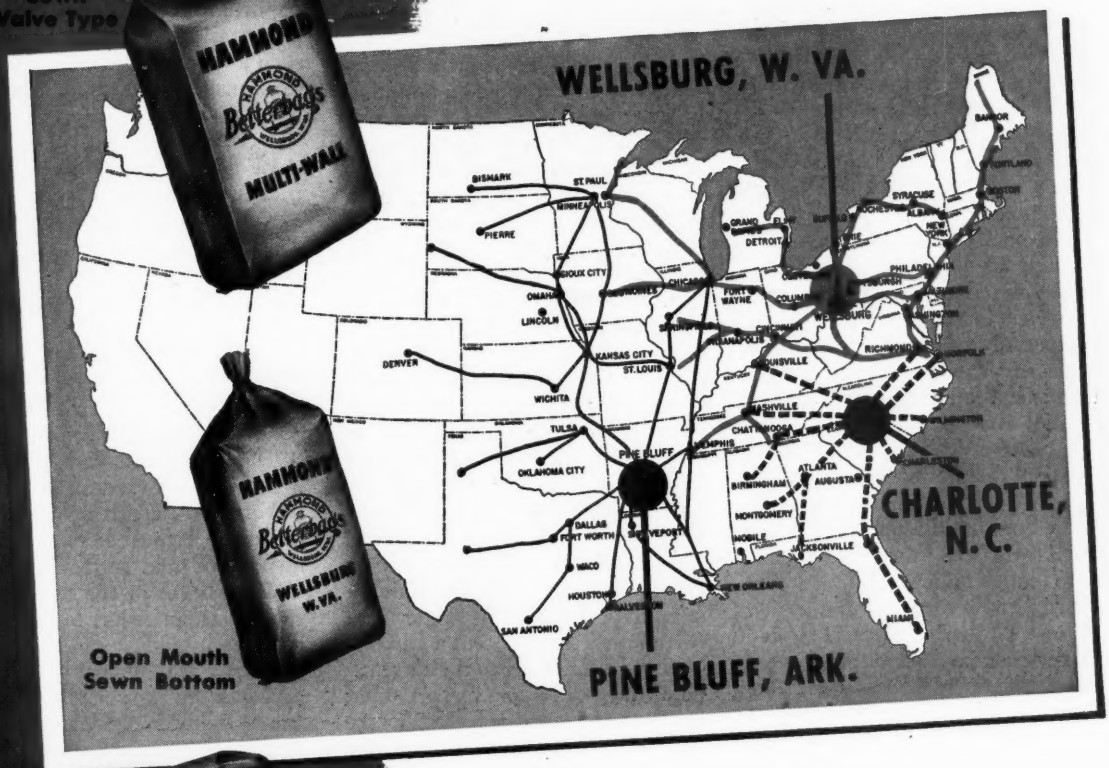

Open Mouth Sewn Bottom

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strange the number of firms that have no clear credit policy.

Any credit organization that must function without a clearly defined credit policy is in the same situation as the boy who received a bicycle from his parents. His first act was to take a spin around the block. After the first trip he shouted, "Look, Mom, no hands." On the second trip he was again exuberant, "Look, Mom, no feet." On the last trip it was, "Look, Mom, no teeth."

Frankly, I do not know how many times any business can go around the block without hands or feet on its credit bicycle, but I am willing to wager that some day it will cost some financial teeth. Then, too, the real victim in such a case may be the pedestrian—or customer. The customer is infinitely better off in doing business with a supplier who has a sound credit policy.

Too much credit or lack of understanding of what the supplier expects has put many a customer in a hopeless financial position. That is expecially true of the distributor or dealer. Too much credit creates a financial management problem for him—one that he is often unable to solve. The records will show plenty of cases where overextension of credit by a supplier has led a dealer or distributor into loose credit practices himself which resulted in his failure.

Let us now turn to the question of how a sound credit policy can be developed. First of all, a clear conception of credit is needed. One point of better understanding is simply this: Credit is not something which you have to give or sell to a customer; it is rather something your customer has which you accept in exchange for your products. The responsibility of your credit department is to determine through factual analysis if your customer's credit is good credit.

Policy Elements

With that starting point, let us consider some possible elements that could be included in a credit policy. It is realized that policy will differ in certain specifics from industry to industry and from business to business. There are, however, certain points that could have general application, such as:

1. You will need a clearly worded statement as to terms of sale. Without this you will have no starting point.

2. At the outset you need some statement that will set a positive note for the policy. It could be as simple as "It is our policy to extend credit *willingly*, etc." I say *willingly* as contrasted to *reluctantly* as the latter word, by inference at least, gets into credit too often.

3. Some reference is needed to indicate that credit is to be extended upon the analysis of factual information rather than upon hearsay information or merely the customer's willingness to give the salesman an order.

4. This analysis of factual information should include an appraisal of whether the customer can pay in line with the terms agreed upon.

5. It is well to indicate clearly that an understanding with each customer as to when payment is expected is a part of your credit policy.

6. Reference to the use of operating capital for receivables is essential in a credit policy. There are practical limitations in every concern as to operating capital usage. The point of control is in connection with the capital used to carry past due receivables.

7. An objective as to the condition of receivables is a good control factor on tying up capital in past due accounts. For example, a minimum objective of 70 per cent currency or 80 per cent currency. You will note I refer to the currency percentage of 70 per cent or 80 per cent rather than expressing the same thing by saying a delinquency percentage of 30 per cent or 20 per cent. That happens to be a part of my thinking that credit terminology is best when expressed positively, for example, "currency percentage," than when expressed negatively, "delinquency percentage."

8. Since all credit operations will show some credit losses, reference to losses in a policy is in order if only to acknowledge the inevitable. However, do not make the mistake of stating a figure as to loss percentage which can be interpreted as an objective to be reached. It, too often, will be reached in good economic times and then greatly exceeded under less favorable economic conditions.

9. All customers cannot always pay their accounts when due and a sound policy will recognize this and provide for it. Such a policy will also outline that a temporary extension should not be permitted to become a permanent injunction against terms. Here is where a line needs to be drawn between credit and financing. Failing in this, the temporary extension deteriorates into financing.

10. Reference to how these things should be done is of value. In reaching credit objectives and applying credit policies the all important point is that credit administration should be handled in such a manner that good customer relationships are established and maintained.

A credit policy constructed along these general lines will provide a framework in which credit can be effectively administered. It will also provide opportunities for the fullest use of credit in achieving the objectives of top management.

Needed by All

In my opinion, every business concern needs a written credit policy. That, of course, means little if the printed word is carefully kept in someone's desk in the head office. For a credit policy to have any value, it must be clearly stated, understood and supported by the sales manager in the field and by the salesman who talks to the customer.

There are basically two approaches to any policy—one is wholehearted support and the other is devious circumvention. To be effective, a credit policy must be so soundly conceived that it warrants wholehearted support. After such a policy has been adopted, it is a management responsibility to see that it is respected.

In recent years, particularly in businesses which have expanded rapidly, there has developed a marked shortage of operating capital.

It is only logical to raise the question as to how much of a company's operating capital should be used for credit purposes—whether it is tied up in receivables or in varied forms of consigned inventory. Some companies have recognized this situation and through

sound credit practices have been able to improve their cash positions materially. Let me illustrate.

Here is a rapidly growing business that suddenly finds itself with a million dollars in accounts receivable on its books, and those receivables are 50 per cent current. This firm recognizes that its delinquent receivables are tying up $500,000.

If this company achieved a current percentage of 70, it would reduce the amount needed for past due receivables from $500,000 to $215,000. This improvement would provide $285,000 in cash for other purposes.

Now if this company reached an objective of 80 per cent currency, a figure common in the petroleum industry, there would be only $125,000 needed to carry past due receivables. In this case $375,000 could be used for other purposes. Unless your company is different from this one I represent, it could find a good use for that money.

Direct Effect

You can see from this example the direct effect of receivable condition on operating capital. Receivables are a part of your working capital, and they should do just exactly what the name working capital implies—work for you. A high percentage of delinquent receivables in any company is an indication of dollars that are not working—lazy dollars. To put lazy dollars to work is just as much a management responsibility as it is to use plant facilities wisely and to control manpower costs.

A slow turnover of receivables also means increased exposure to risk. When an account becomes past due, the chances of collection decrease with age. It is easy to be deceived by the credit loss experience of the past several years. We tend to forget that we have been doing business in the greatest boom in history—during conditions of inflation and full employment.

Every industry has shown a sharp drop in credit losses and it has been due to the favorable economic climate rather than special attention to credits. There is no doubt now that our economy is changing, and credit losses are on the rise. It is more necessary today than it has been previously to consider the loss expectancy that will come from anything less than sound credit policies that are wisely administered.

A credit policy is like a triangle. It has three sides—financial, sales and customer relations. The three should always be in balance.

I have tried to show how the wise administration of a sound credit policy can contribute to a healthier working capital position and minimize credit losses. Surprisingly enough, the wise application of such a policy is also a sales advantage. All of us know that a customer owing a past due bill is the one who is most likely to be lost to a competitor.

Terms Can Be Sold

I know from experience that credit terms can be sold, and once there is a mutual understanding with the customer, there is a solid base for future sales. Here the financial opportunities can also become sales opportunities.

Therefore, when I propose to you the need of sound credit policies and special attention to the administering of those policies, it is done with a recognition of current conditions both from an economic and a sales standpoint.

The current situation from a credit standpoint will tax the ingenuity of any business concern. For the company that has clearly stated terms and policies there are three items of advice that I think will help make the best use of credit and of the dollars it uses in receivables:

One—Determine if the customer's credit is good credit before you accept it in exchange for your products.

Two—Have an understanding with each customer as to when payment is expected.

Three—Ask for your money when it is due.

These three things are so basic and easy to understand that their real work may be overlooked. I will admit they lack any involved phraseology about assets, liabilities, working capital, trading on equity, net worth or ratios, but they are result producing. They go a long way toward getting and keeping customers who represent a continuing sales outlet for your products.

It is important that these three things be done—but how they are done is even more important. How they are done produces a lot of good-will as well as results.

Now I have centered my remarks around credit policies and objectives. I have said little about how these policies should be executed and the objectives accomplished. The answer is in the proper delegation of authority and responsibility to the credit organization. Authority and top management support equal to responsibility must be established.

In the field of credit, much emphasis is placed on "Man's Confidence in Man." This certainly applies to the relationship between supplier and customer. There is also a place for it between supplier and supplier. Mutual confidence among credit grantors will do much to build sounder credits in any industry and in the nation's business structure as a whole.

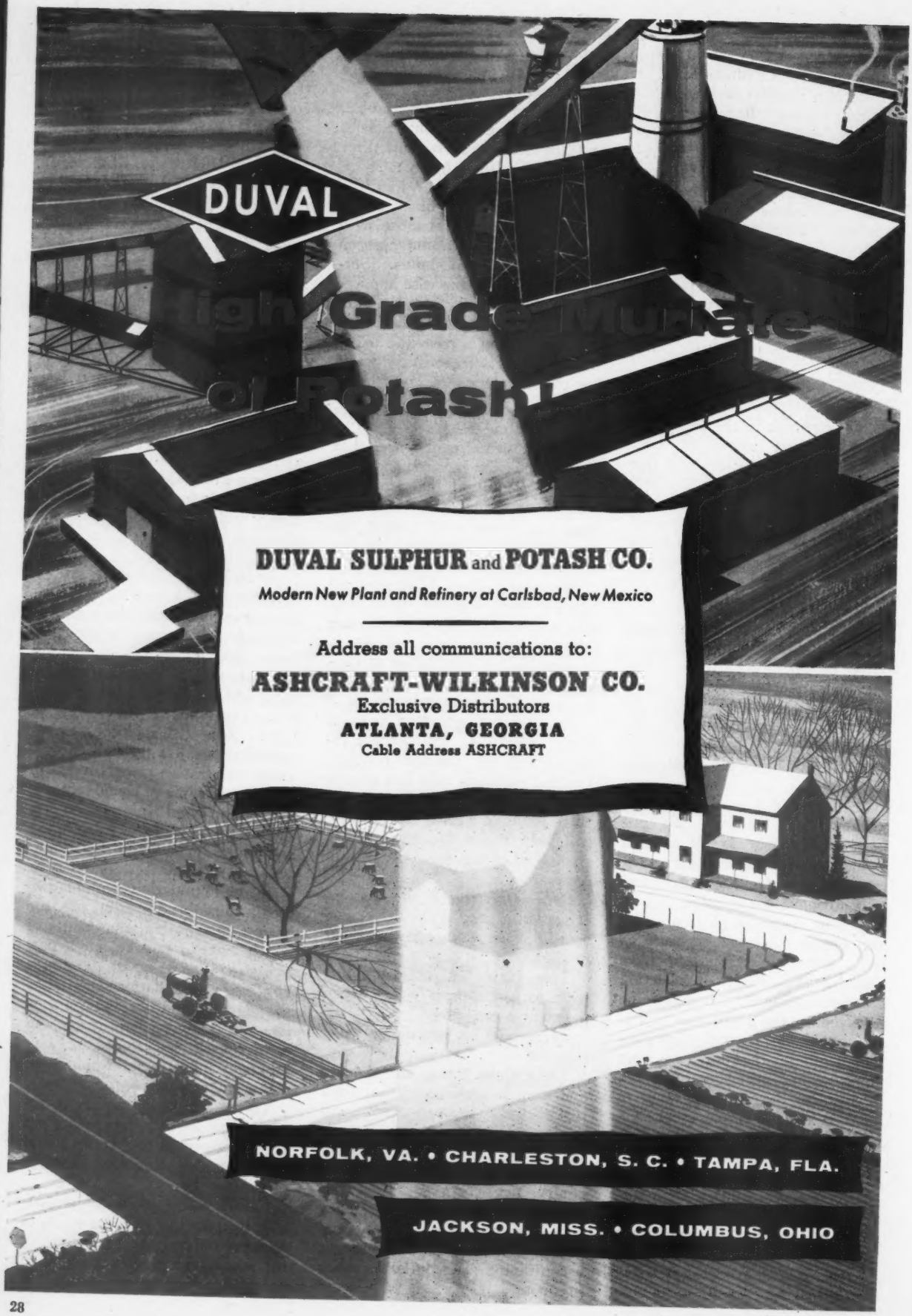
Interchange Information

A considerable part of credit reporting is based upon the confidential exchange of credit experience. Such interchange of information has materially aided in the development and use of credit in our country. The National Association of Credit Men, with its local member organizations, has through encouraging cooperation greatly aided in creating a feeling of confidence.

Certain trend information regarding credit is of real value in the creation of policies and the administration of credits. The Credit Research Foundation conducts two credit surveys annually for the petroleum industry, the results of which make it possible for a participating company to determine how its results relate to the industry generally and to trends on such items as currency percentages and credit losses. Such things are helpful in any industry and would serve a constructive purpose in yours.

To the best of my ability to appraise and predict, the credit ideas I have presented to you are sound whatever the economic developments may be.

Credit wisely used will materially help in the building of sales and profits and the opportunities for sound credit management in the year of 1954 are unlimited. ◆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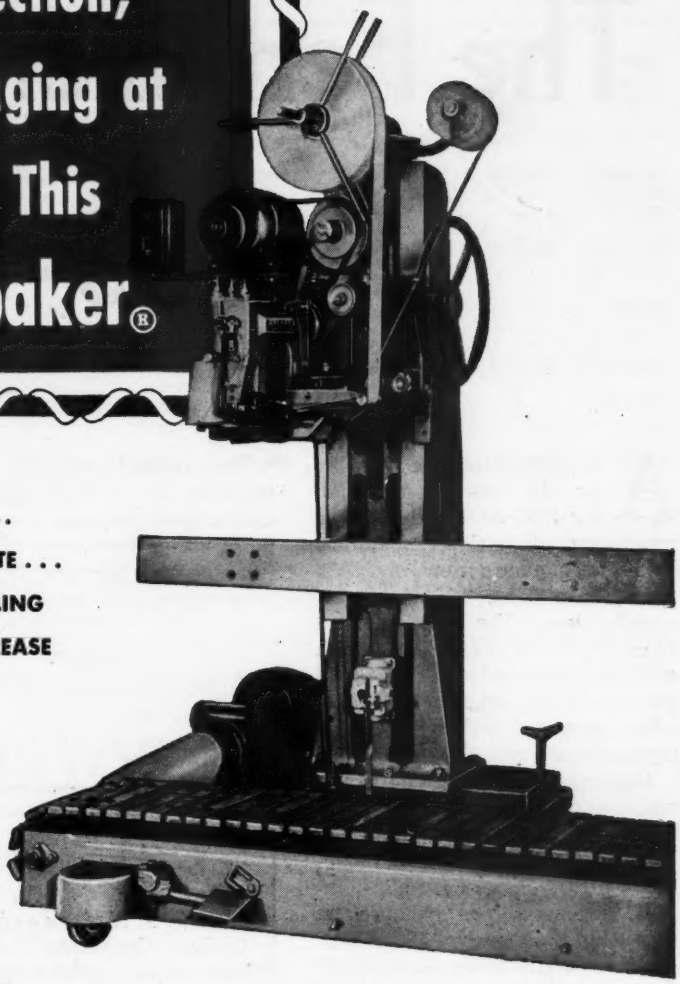

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You don't have to scrap your present equipment to get *stronger*, more *economical* bag closures with this Model ET Bagpaker. One man—receiving bags from your existing weighing and filling set-up—applies creped "*kraft*" sealing tape over the bag end...sews a reinforced "cushion stitch" through both tape and bag ...and neatly trims tape...time 4 seconds or less. Dimensional drawings and detail information are available in Booklet ET FC-12 Write for your copy *today*. Bagpak Division, International Paper Company, 220 East 42nd St., New York 17, N. Y.)

Model ET applies famous "Cushion-Stitch" over dry tape for sift-proof closure. Model E-1 applies "Cushion-Stitch" only, for use where sift-proofing is not essential.

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- ★ **15 bags per minute with one operator when filled bags are continuously delivered to conveyor.**
- ★ **Quickly adjustable for bags of from 25 to 100 lb. capacity.**
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The Fertilizer Situation 1953-54

A supplemental USDA report on the fertilizer situation for 1953–54 states that the movement of fertilizer materials into trade channels from July, 1953 through January, 1954 was unusually slow. The drop was said to exceed 25 per cent in some areas with an estimated decrease of 12 per cent for the industry as a whole when compared with the previous corresponding period.

Beginning in late February, the situation gradually changed and by mid-March shipments in many areas exceeded the rate of movement in the spring of 1953.

It is generally felt, the report continues, that the over-all tonnage may be slightly below the 1952–53 figure, but that the tonnage of plant nutrients used may exceed the record set in 1952–53.

Over-all supply of NPK is said to be ample although the usual local shortages of some materials will occur and, due to the reluctance of users to order in advance of time needed, some may be unable to obtain exactly the kind of material desired.

The revised estimate on the quantity of NPK available for agricultural purposes is 6.071 million tons, an increase of about two per cent over the 1952–53 reported deliveries of 5.957 million tons.

Nitrogen

Current estimates place the supply of nitrogen available for fertilizer purposes at 1.916 million tons.

From "The Fertilizer Situation for 1953–54, Supplemental Report, March, 1954," prepared by J. N. Lowe and C. A. Graham, Commodity Stabilization Service, Mobilization Activities division, USDA.

The figure is based on July-January production, current production rates and probable contribution of synthetic ammonia facilities recently completed and those scheduled for completion during the remainder of the fiscal year.

Also taken into consideration is the continuing high level of imports. During the past three years, the report points out, imports have made increasing contributions to the nitrogen supply.

Forecast supply represents an increase of about 6.2 per cent over the 1.804 million tons reported delivered to the trade in 1952–53.

Phosphates

The revised estimated supply of phosphates, as available P_2O_5, is 2.325 million tons, a 12.8 per cent decrease from the previous estimate and 3.7 per cent lower than the 2.414 million tons reported as available in 1952–53.

Total production of P_2O_5 during the period July-December, 1953 was about 4.5 per cent below the corresponding 1952 period because of reasons other than productive capacity. A decrease in production of normal superphosphate accounted for the tonnage loss; however, the supply of triple and complex phosphates will exceed the previous year's supply.

Potash

Potash supplies available for fertilizer, as K_2O, will total 1.830 million tons, according to the report. This represents a decrease of 4.4 per cent from earlier estimates but is 5.2 per cent more than the 1952–53 supply.

This revised estimate reflects the probable trade deliveries based on prospective demands rather than actual above-ground supplies. ◆

USDA Report Indicates Possible Record High Plant Nutrient Totals, Slight Drop in Fertilizer Tonnage. High Analysis Trend Continues.

Estimated 1953-54 Supply for Fertilizer Purposes

NITROGEN

(In tons of 2,000 pounds N)

Source	Ammonium Nitrate All Grades	Ammonium Sulfate & Ammonium Sulfate Nitrate[1]	Other Solids[2]	Natural Organics[3]	Compound Ammoniating Solutions AN-NH_3 & UAL[4]	NH_3 for Ammoniation[5]	Ammonia for Direct Application[6]	Total by Source
U. S. Production								
Synthetic ammonia	285,000	115,000	100,000	—	405,000	70,000	325,000	1,300,000
By-product ammonia	—	177,000	—	—	—	3,000	—	180,000
Natural organics	—	—	—	35,000	—	—	—	35,000
Total	285,000	292,000	100,000	35,000	405,000	73,000	325,000	1,515,000
Exports	1,000	7,000	11,000	1,000	20,000	—	—	40,000
Net Domestic Production	284,000	285,000	89,000	34,000	385,000	73,000	325,000	1,475,000
Imports	180,000	90,000	166,000	5,000	—	—	—	441,000
Total Supply— U. S. & Poss.	464,000	375,000	255,000	39,000	385,000	73,000	325,000	1,916,000
Per cent (increase or decrease) of November, 1953 estimate								**+.5**
Per cent (increase or decrease) of 1952-53 supply								**+6.2**

For the purpose of this tabulation, the following groupings have been made:

[1] Includes estimated ammonium sulfate content of imported and exported mixed fertilizers.
[2] Includes estimated ammonium phosphates, sodium nitrate, urea mixtures, calcium nitrate, cyanamid and nitraphosphates.
[3] Estimated nitrogen content of natural organics used in commercial fertilizer.
[4] Includes estimated nitrogen content derived from solutions and ammonia in exported ammoniated superphosphates and mixed fertilizers.
[5] Includes compound nitrogen solutions, ammonium nitrate solutions, ammonia liquor and aqua ammonia used for ammoniation.
[6] Includes nitrogen solutions and a small quantity of aqua ammonia for direct application.

PHOSPHATE

(In tons of 2,000 pounds P_2O_5)

Source	Normal superphosphate	Concentrated superphosphate	Other[1]	Total by source
U. S. Production	1,600,000[2]	500,000	250,000	2,350,000
Exports	53,000	10,000	7,000[3]	70,000
New supply, U. S. Production	1,547,000	490,000	243,000	2,280,000
Imports	1,000	1,000	43,000[3]	45,000
Total Supply—U. S. and Poss.	1,548,000	491,000	286,000	2,325,000
Per cent (increase or decrease) of November, 1953 estimate				**-12.8**
Per cent (increase or decrease) of 1952-53 supply				**- 3.7**

[1] Includes estimates for complex phosphatic materials.
[2] Includes wet-base goods.
[3] Includes P_2O_5 content of prepared phosphatic mixtures, ammonium phosphates and ammoniated superphosphates.

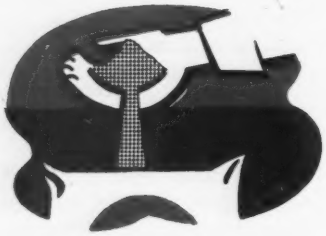
POTASH

(In tons of 2,000 pounds K_2O content)

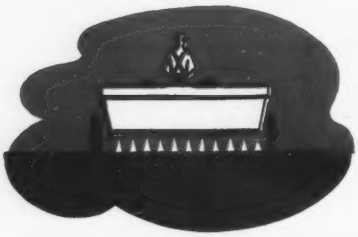
Source	Muriate of potash 60% and 50% grade	Sulfate of potash & sulfate of potash magnesia	Manure Salts	Misc. & by-product materials[1]	Total by Source
Deliveries from U. S. production	1,619,000	106,000	1,000	34,000	1,760,000
Exports	40,000	6,000	—	4,000	50,000
Net supply—U. S. production[2]	1,579,000	100,000	1,000	30,000	1,710,000
Imports	95,000	15,000	—	10,000	120,000
Total Supply—U. S. and Poss.	1,674,000	115,000	1,000	40,000	1,830,000
Per cent (increase or decrease) of November, 1953 estimate					**-4.4**
Per cent (increase or decrease) of 1952-53 supply					**+5.2**

[1] Includes potash content of oilseed meal and by-product residues used for fertilizer, potassium nitrate and calculated potash content of mixed fertilizers, exported and imported.
[2] Net supply from U. S. production is based on prospective demand rather than capacity of the industry to deliver from domestic production. The above-ground supply is in excess of the figures shown.

DAVISON GRANULATED Superphosphate 3 WAY CONTROL



STORAGE CONTROL—No caking or lumping while in storage.



APPLICATION CONTROL—No dusting or bridging; drills free and even.

FOOD CONTROL—Supplies plant food at a uniform rate.

Now it is possible for you to store superphosphate without fear of its caking . . . that is, if it is DAVCO GRANULATED SUPERPHOSPHATE. DAVCO Granulated Superphosphate will not become hard or caked . . . it is easier to apply in the field because there is no dusting or bridging over in the drill.

DAVCO Granulated Superphosphate gives complete coverage in the field . . . drilling freely and evenly . . . supplying each plant with a uniform quantity of nutrient phosphorus.

Get DAVCO Granulated Superphosphate . . . the superphosphate that gives you the added sales points through its 3-way control.

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Dr. Paul D. Sanders

Benson, Sanders, Panel on APFC Program

Secretary of Agriculture Ezra Taft Benson heads the impressive list of speakers scheduled to address delegates to the American Plant Food Council's ninth annual convention at The Homestead, Hot Springs, Va., June 10–13.

Paul T. Truitt, council president, has also announced that Dr. Paul D. Sanders, Richmond, Va., editor of THE SOUTHERN PLANTER, will be the banquet speaker on Saturday evening, June 12.

A meeting of the council's board of directors will be held on Thursday, June 10, preceding the opening of the convention.

Convention activities will begin Friday morning, June 11, with the annual address by APFC President Truitt, followed by four speakers in a panel program concerning agricultural public relations. Robert H. Reed, editor, COUNTRY GENTLEMAN, will be moderator, with other members of the panel including Stanley Andrews, managing director, National Project in Agricultural Communications, Michigan State College, and Ed Lipscomb, director of public relations, National Cotton Council.

Louis H. Wilson, secretary and director of information for the council, will present awards to two outstanding farm magazine editors, representing the winners in the council-sponsored "Soil Builders Award for Editors" contest. This contest was initiated in cooperation with the American Agricultural Editors' Association for the purpose of recognizing both editors and their staff members "who have rendered outstanding service as soil builders and, as such, builders of a more sound and profitable farming system."

Speakers appearing on the June 12 program will include Rep. C. B. Hoeven (R-Ia.), chairman, House Agriculture Subcommittee on Fertilizer and Farm Machinery; Secretary Benson and Dr. Earl O. Heady, professor of Agricultural Economics, Iowa State College. The council's annual business meeting will follow with reports from the Credential and Nominating committees, followed by the election of eight new directors.

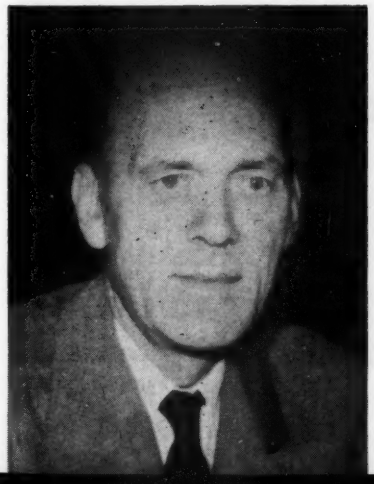
Other features of the convention will include an after-dinner reception, sponsored by Southwest Potash Corp. on Friday evening and a Hospitality Hour, courtesy of Potash Co. of America, on Saturday evening. Affairs will be climaxed with the annual banquet on Saturday evening.

W. T. Wright, Norfolk, Va., is chairman of the Convention committee. Other members include Horace M. Albright, New York City; W. B. Copeland, Norfolk, Va.; Edwin Pate, Laurinburg, N. C.; P. J. Prosser, Baltimore, Md. and James F. Doetsch, New York City (ex officio).

Other committee chairmen include Raymond R. Hull, Camden, N. J., Nominating; M. S. Wright, Nacogdoches, Tex., Memorial; Mrs. John W. Hall, Chevy Chase, Md., Ladies'; Dean Gidney, New York City, Golf and Mrs. Ed Kolb, Ridgewood, N. J., Ladies Golf.

More than 550 industry members, together with agricultural, education and research leaders, are expected to attend the 1954 convention. ◆

Robert H. Reed



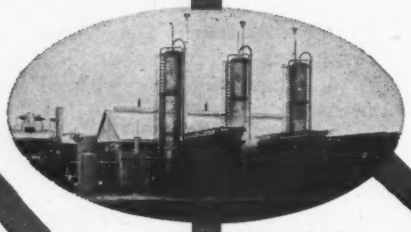
Ed Lipscomb

Rep. C. B. Hoeven

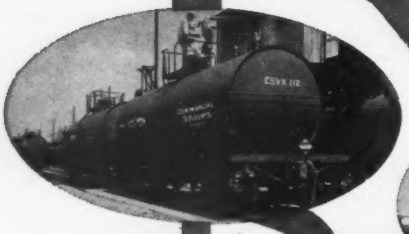
CSC NITROGEN PRODUCTS

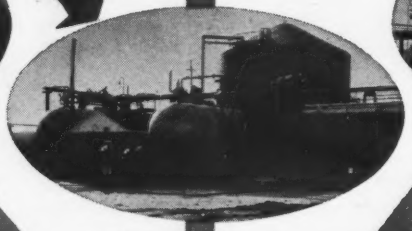
Sterlington, Louisiana

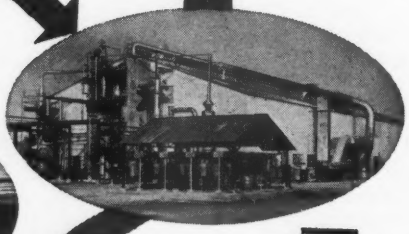
ANHYDROUS AMMONIA



Nitric Acid







Liquid Ammonia

Nitrogen Solutions

Solid Ammonium Nitrate

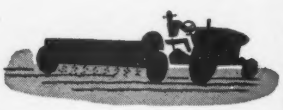
To Farmer via Distributors

Liquid ammonia under pressure is supplied through distributors to farmers for application directly to soil

To Fertilizer Manufacturer

Nitrogen solutions and anhydrous ammonia are used in the production of mixed fertilizers widely used by farmers

To Farmer via Dealer



CSC solid ammonium nitrate fertilizer is distributed by fertilizer manufacturers through dealers to farmers

COMMERCIAL SOLVENTS CORPORATION

Agricultural Chemicals Sales Department CSC 260 Madison Avenue, New York 16, N.Y.

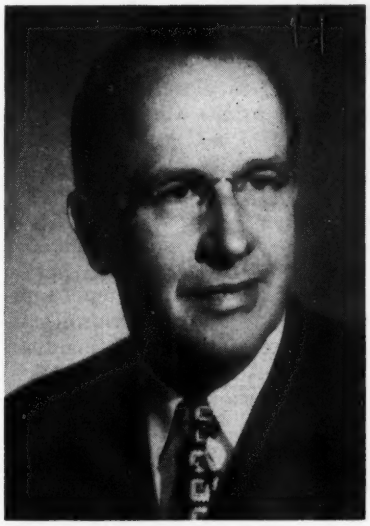
Kapusta and Tucker Head NFA Convention Panels

Two noted speakers and two symposia will be featured at The National Fertilizer Association's annual spring convention at The Greenbrier Hotel, White Sulphur Springs, W. Va., on June 14–16.

Principal speakers at the affair will be Secretary of Agriculture Ezra Taft Benson and Congressman W. Sterling Cole, chairman of the Congressional Joint Committee on Atomic Energy.

H. H. Tucker, president, Coke Oven Ammonia Research Bureau, will be moderator for a panel on sales development and Edwin C. Kapusta, NFA chemical engineer, will head the symposium on granulation processes in the production of fertilizer. Participants in both panels will be outstanding authorities.

A full social schedule will be highlighted by the annual convention dinner and a cabaret party. For the ladies there will be a garden party and a bridge and canasta party while golf, tennis and horseshoe tournaments are planned for both men and women.



Ezra Taft Benson

Directors will be chosen in the annual election to succeed board members whose terms have expired. The new board will hold an organization session on June 16 following the last general session. Officers for the coming year will be elected at that time.

Present NFA board officers include Louis Ware, chairman; E. A. Geoghegan, vice-chairman; Russell Coleman, president and William S. Ritnour, secretary-chairman.

Hospitality committees for the convention are headed by W. F. Price, Swift & Co. and Mrs. Louis Ware, wife of the NFA board chairman.

Chairmen of the Social and Recreational committees include Mrs. J. A. Naftel, ladies' bridge and canasta party; John W. Hall, men's golf; Mrs. W. B. Porterfield, ladies' golf; Joseph Mullen, Jr., tennis and A. A. Schultz, horseshoes. ◆

W. Sterling Cole

Edwin C. Kapusta

H. H. Tucker

Know your cost factors before pricing

W. T. Seney speaking at NAC meeting.

Use Sound Cost Accounting Practices

By Wilson T. Seney
McKinsey & Company

The pesticide industry represents large and small companies, basic producers and formulators, integrated and non-integrated companies, companies which sell direct to the retailer and those which distribute through wholesalers.

In spite of these differences, all are faced with many common problems. And on some of those problems, sound cost accounting practices are being of real help to quite a few of you, and can be to all of you.

For instance, let's consider just one relatively well-defined problem involving the interplay of volume, costs, selling prices and profits.

In a period of weak market demand and corresponding downward pressure on prices, each of your companies is faced with a relatively clear-cut choice. Should you attempt to maintain volume by reducing prices, or should you maintain prices and reconcile yourself to some reduction of volume? Obviously, the answer to that question will have a direct and significant effect on your profits.

From an address delivered before the Spring Meeting of the National Agricultural Chemicals Association, Houston, Tex. March 26, 1954.

It is surprising how many people in these circumstances tend automatically to think in terms of cutting prices in order to maintain volume. Actually, in many cases, you may show better profits by maintaining prices and reducing volume. This statement, of course, is true only within limits. If volume is reduced enough, substantial losses can result. And this could happen if a single manufacturer held his prices constant while his competitors reduced their prices.

Nevertheless, we can agree, I think, that there is more than one side to the question: Should we maintain volume by cutting prices or should we maintain prices and reduce volume? It is equally important to realize that sound cost accounting practices will enable you to investigate each individual situation in terms of the dollar effect on profits resulting from each course of action.

Example of Planning

In order to make clear by example what this means, let's take a look at a simplified profit projection for a farm chemicals manufacturer (table I). If you look at the relationship of material costs to sales income you will see that it is typical of the cost picture of a non-integrated producer. That is, the relative cost of materials in relation to sales indicates that this company is making pesticides from materials bought on the outside.

These figures could be changed to exemplify an integrated producer simply by reducing the relative cost of materials and correspondingly increasing the other elements of cost. Therefore, the comments I am about to make will apply to both integrated and non-integrated companies, and will differ in their application only in degree.

This set of profit projections presents an original profit plan and two possible changes from the original profit plan. Of the two changes, the first reflects a reduction in sales volume of 10 per cent but no reduction from the originally planned selling price. The second variation reflects a volume unchanged from the original plan, but the selling price is reduced 10 per cent from the originally planned selling price.

Now, let's look at the most interesting part—at the bottom, where it says "profit." This business can plan a profit before taxes of $50,000 or $35,000 or zero—depending on volume and price factors. The $50,000 is based on originally

planned volume and price. The $35,000 is based on a reduction of 10 per cent in volume with selling price held constant. The zero profit is based on originally planned volume, but a reduced selling price of 10 per cent.

Reduced Sales Income

Looking at "Income from Sales," we note that the original plan calls for $500,000. A 10 per cent change in either *volume or price* will, of course, result in a reduction of sales income to the $450,000 shown.

Looking next at costs, you will notice that they are divided into variable costs and fixed costs. Variable costs increase or decrease directly with the volume of production and sales. Please notice that materials and supplies, variable labor, variable power and packages change in this example as volume changes. When volume drops 10 per cent from $500,000 to $450,000, then total variable costs also drop 10 per cent from $330,000 to $297,000.

Fixed costs include supervision, selling expenses, fixed portions of labor and power and the overhead represented by office expenses, local taxes and insurance and depreciation. Fixed costs are those costs for which you are more or less committed, regardless of the volume of sales or production. In this example, the total of fixed costs remains at $100,000 regardless of volume or selling price changes.

Now let's go back and put sales and costs together to arrive at profits. If we read down the column headed "Items of Income and Cost," we find that sales income less freight and less variable costs equals marginal return. In the original plan, $500,000 sales income less $20,000 freight, less $330,000 variable costs results in a marginal return of $150,000.

Fixed costs of $100,000 are subtracted from the marginal return to arrive at a profit before taxes of $50,000. Assuming normal tax rates, this leaves a profit after taxes of $29,500.

Alternatives

Let's suppose that some time after the original plan has been prepared, economic conditions and market demands change. There is a downward pressure on prices, and there is no strong demand for the product. The producer is faced with a choice of holding his selling price constant and reducing volume or of reducing selling prices and maintaining volume. The planned profit results of these alternative courses of action are quickly spelled out.

If price is held constant, and a 10 per cent loss in volume is incurred, sales volume is reduced 10 per cent to $450,000. Variable costs are likewise reduced 10 per cent, so that freight is only $18,000 instead of $20,000. Similarly, the plant variable costs become $297,000. This results in a marginal return of $135,000.

In other words, sales income is down $50,000, but this is offset by a reduction of $35,000 in variable costs, so that the net reduction in marginal return is only $15,000. The fixed costs subtracted from marginal return remain the same, so that the net reduction in profit before taxes is also $15,000. Thus, we forecast that a reduction in volume of 10 per cent at a constant selling price results in a reduction of profit before taxes of $15,000, or after taxes of $7,200.

Now, let's look at the planned profit results of the alternative of reducing selling price to 10 per cent and holding volume constant. Again, income from sales is $450,000. However, there is no reduction in variable costs, because there has been no reduction in volume. Therefore, freight and variable plant costs remain as they were in the original plan, and that is $20,000 and $330,000 respectively. Marginal return now becomes $100,000. Since marginal return and fixed cost are now equal to each other, profit before taxes is zero. Thus, if the second alternative is followed, reduction in profit before taxes is a full $50,000.

Probably the conclusions to be drawn from this example are not new to most of you. There is nothing startling in the news that lower price or lower volume frequently means lower profits. However, even when "everybody knows the answer," it is often difficult to get the proper dollar signs on these answers which "everybody knows."

Table 1. Planned Profits—Pesticide Sales

ITEMS OF INCOME AND COST	ORIGINAL PLAN	POSSIBLE CHANGES: Volume Down 10% Selling Price Constant	POSSIBLE CHANGES: Volume Constant Selling Price Reduced 10%
Income From Sales	$500,000	$450,000	$450,000
Less: Freight	20,000	18,000	20,000
	$480,000	$432,000	$430,000
Less Variable Costs:			
Materials & Supplies	310,000	279,000	310,000
Variable Labor	8,000	7,200	8,000
Variable Power	2,000	1,800	2,000
Packages	10,000	9,000	10,000
	$330,000	$297,000	$330,000
Marginal Return	$150,000	$135,000	$100,000
Less Fixed Costs:			
Supervision	25,000		
Selling Expenses	35,000		
Fixed Labor	8,000		
Fixed Power	2,000		
Office	5,000		
Insurance	10,000		
Depreciation	15,000		
	$100,000	$100,000	$100,000
Profit Before Taxes	$ 50,000	$ 35,000	$ -0-
Federal Income Tax	20,500	12,700	-0-
Profit After Taxes	$ 29,500	$ 22,300	-0-

1954, McKinsey & Company

The significant thing about this example to me is that specific alternatives can be quickly measured in specific dollar terms. This is something that cannot be done in many accounting systems.

Sound Accounting

What sort of cost accounting practices are best suited for answering this and other profit planning problems? There are three guides to sound accounting for profit planning:

1. Keep your reports simple and easily understandable.
2. Know all your cost facts, including the ones you cannot easily see.
3. Organize your cost facts so that they can be used for estimating profit results.

Keep Reports Simple

Keeping reports simple depends on the exercise of good management thinking to define what is really required in the way of information to run the business. Once this has been established, then self-discipline is required to reduce the number of reports and the amount of figures to the required specifications, and to keep them that way.

Another way of looking at this matter of simplicity is to recognize that there are limits to the use of any accounting figures. Some figures may state the value of an inventory admirably, and yet those same figures may be very poorly suited to costing alternative management choices. So, if you want to keep reports simple and understandable, you will prepare figures with their end use in mind.

Know Cost Facts

Larger companies generally do a better job than smaller companies in the field of defining and knowing their costs. I think that all of us know at least one small processor who has run into serious financial difficulties because of his failure to provide for unexpected or hidden costs. Some of the other speakers at this conference have pointed out the major hazards and risks involved in this industry.

We should remember that these hazards and risks carry dollar signs. The suits being brought against members of this industry on the basis of alleged damage to persons and property cost money to defend, regardless of the outcome of the litigation. In the final analysis, there is only one place for this money to come from, and that is out of sales income. Therefore, sales prices should be set with that fact in mind.

Along the same lines, inventory problems also cost money. It is a fairly common occurrence to find your inventory in the wrong sections of the country to meet current demand. It then becomes necessary to tranship to another location in order to sell the goods. The additional freight costs, just like any other expenditure, should be provided for in sales income.

In addition, all price setters should remember that only out of sales income can they obtain the funds to replace old equipment and depreciated assets. And if you are one of the larger companies in this industry, you will include in your costs the funds required to pay for research to improve your products.

Organize Cost Facts

Management planning really comes down to a choice among alternatives. No matter how restricted the business outlook may be, management has a freedom to choose to do this or to do that. Making a decision in business may be compared with making a decision in poker. Your decision is based not only on what you can see in your books, but also on what you think your competitor sees in his books.

In addition, of course, your decision is shaped by considerations of markets, strategic advantages, future development possibilities and many other factors. These imponderables and intangibles necesssarily and properly play a great part in business decisions.

However, it still remains true that one of the important factors involved in a choice between alternatives is the estimated profit result of one course of action compared with the estimated profit result of another course of action.

The cost figures of your business should be accumulated, handled and presented in such a manner that they can be used to predict profit results of different courses of action quickly and with reasonable accuracy. In other words, your cost figures should be based on the sort of approach which was used in the example of planned profits, referred to earlier.

Sound accounting control practices and good forecasting and budgetary control techniques each year become more and more of a necessity for any business enterprise. At the present moment in the farm chemicals industry, many managements are facing decisions which call for a high degree of skill in estimating and measuring costs. Our example is representative of only one of many such situations.

Just one further comment. The industry you represent has contributed substantially to the well-being of our economy. In making this contribution, your managements have obviously made more right decisions than wrong ones—and many such decisions have been made successfully without benefit of the most advanced accounting techniques.

It is fundamental to recognize that an industry's men are more important than its accounting techniques. But it is also important, I believe, to recognize that management decisions can be made faster, and more soundly, and on more justifiable grounds, if they are made with the help of sound cost accounting procedures, and leavened with a dash of business judgment and imagination. ◆

At the Chuck Wagon

E. Witman, Columbia-Southern Chem. Corp., and R. R. Wangerin, Monsanto Chem. Co., talk at Chuck Wagon Dinner, held during NAC's Houston meet. W. T. Seney, this article's author, spoke before the group on March 26.

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NAC Counsel Discusses

Legal Aspects of Research and Production Control

By John D. Conner
Counsel
National Agricultural Chemicals Association

It is a sound principle of military tactics that in planning a campaign one must assume and prepare to defend his poorest possible position.

For the purposes of our discussion we may assume that your "poorest possible position" is reflected when the marshall or the sheriff appears with a summons advising that some poor, misguided plaintiff has brought suit in which he alleges that he has been damaged because of some shortcoming in your product. He asks that the court require you to compensate him for this loss. You call in your lawyer, begrudgingly and reluctanly, and turn over to him the task of defending your position.

It is from the perspective of this "poorest possible position" that we now turn to a consideration of research and production controls. In this consideration I will attempt to confine the discussion to questions concerning which the lawyer may be presumed to have some degree of expertness, namely the type of evidence which he wishes his client could furnish him when he is caught in this "poorest possible position."

But it is inevitable that in discussing the question of research and production controls, the lawyer must to some extent assume the role of the pseudo-scientist and technician and the consequent risk of inaccuracy and improbability. However, I have long ago realized that when my suggestions and requests become tinged with the air of impracticability, my colleagues in the field of science are not hesitant to so inform me. With that understanding I shall be less hesitant to occasionally venture into fields in which my qualifications are questionable.

Let us now direct our attention momentarily back to our assumed "poorest possible position." or the point at which we have just been served with a summons.

We cannot be certain in advance of the exact nature of the damages which the product will be alleged to have caused.

Three Basic Deficiencies

Whatever type of action it might be, it would arise, in all probability, because of one or more of the three basic deficiencies:

First, inadequate research to determine the capabilities and limitations of the product and the manner in which it is properly used;

Second, the failure to use production controls adequate to assure that the product is so produced and packaged that it meets the standards developed as a result of the research or

Third, the failure to label, advertise or otherwise represent the product so that it properly reflects the capabilities, limitations and precautions developed by the research.

My remarks will be directed to the first two of these basic deficiencies—research and production control.

Of one thing we may be certain. You cannot wait until after your "poorest possible position" materializes to conduct your research and establish your production controls. Your lawyer cannot defend your case on evidence manufactured after the action is brought.

The legal implications of research fall into two categories. First, to what points should research be directed and, second, what mechanics should be used to conduct and record that research?

Legal Requirements

Legal requirements dictate the scope and direction of your research. Our consideration of this question must be rather summary. The requirements for each product will vary.

Probably the most direct answer to the question of the points to which research should be directed is found in the regulatory provisions of the Federal Insecticide, Fungicide and Rodenticide Act and the counterpart state acts. Most of you are familiar with those provisions. But do not make the mistake of believing that you have fully met the requirements of those acts just because your product has been accepted for registration.

Listen to what the Supreme Court of Virginia recently said in

←
John D. Conner, NAC counsel, addressing delegates at the association's spring convention at Houston, Texas.

the McClannahan case in discussing the obligation imposed by these statutes:

> *"Back of both the Federal and Virginia statutes lies the need to provide the public with a higher and a surer degree of protection than is afforded by exclusive recourse to common law remedies. . . . . The statute itself creates the standard of conduct required. . . . ."*

In other words the court said that if any pesticide manufacturer violates any provision of the Federal or state law, he is responsible for the damages resulting from that violation—and the question of whether there has been a violation of the statute is to be left to the jury.

Therefore, the extensiveness and scope of the questions to which research should be directed must be measured primarily against the requirements of the pesticides statutes, as supplemented by the regulations and interpretations issued under those statutes. Remember that those statutes are broadly construed to give maximum protection to the public, to useful vegetation and animals. The provisions through which this protection is accomplished are myriad. Your research must be extensive enough to meet those requirements.

There are other legal requirements in addition to these statutory requirements. The common law requires each person to exercise ordinary prudence in designing and marketing his products. However, these somewhat general requirements lose their significance when they are measured against the specific provisions of the pesticide laws.

Mechanics of Research

The second facet of this question relates to the mechanics through which the research should be conducted and recorded to assure that it will serve its purpose most effectively if its use as evidence should be required.

Who is to conduct the research, and where is it to be performed? On these points, the decision of the lawyer and the scientists will be substantially the same. Both will want to assure that in the case of field tests, the geographical areas in which the tests are conducted will be representative of all areas in which the product is to be used. The lawyer may be inclined to stress the desirability of having the research conducted by a public institution. He may believe that research conducted under such circumstances would be more impressive to a jury.

It is essential that the person conducting the research record fully all observations on any factor which could be relevant in any future product liability action, regardless of how obvious these observations may appear at the time. For example, if an insecticide is being field tested for insecticidal activity, the conditions of the foliage should be recorded at the time of each inspection. If it is not, it would be rather unconvincing for the researcher later to tell a jury that the condition of the foliage must have been good or he would have made some notation to the contrary.

The research must be extensive enough to obtain data on all stages of plant growth to reflect practical farm procedures.

Likewise, the researcher should record fully all variables which possibly could affect any performance or safety characteristic of the product. For example, if the amount of rainfall, the temperature or the foliage condition at the time of application could vary the phytotoxicity, these variables should be recorded.

After this basic research is concluded, the appraisal of the data on all relevant factors should be reduced to writing. If the data show a critical range for any variable which may affect any performance or safety characteristic, this point should be emphasized.

Permanent Records

All the basic research data and the evaluation should then be compiled and prepared as permanent records. Valuable time will be lost at the most critical time of the case if you must scurry around and complete all this information after the action arises. I suggest that a number of copies of both the basic research data and the evaluation be prepared and retained, so that it will be immediately available in such a form that it tells the entire story of your research.

The question may arise of the extent to which you may rely on research work conducted by others in marketing your product. Remember that when you market a product under your name you assume responsibility for it. It would be no defense for you to tell the jury that you thought the product was safe because other persons had tested it, or recommended it, even though the others might be a governmental agency or a land grant college.

Of course, you may rely on the research of others if the result of that research is available to you for evaluation and use as evidence if it is required. However, I recommend that before you market a product based upon the research of others, you examine the basic data, evaluating it, and make certain that it will be available to you as evidence if you should require it.

Plant Operations

With the conclusion of research, we reach the point where plant operations begin. We leave the first area of risk and enter a second. Here the problem takes on different characteristics. The first problem was to develop a product which is safe and effective. The second problem is to assure that the fruits of this research are not lost in the process of production—that the items leaving your factory conform to the standard product.

What controls can be adopted which later can be used as evidence that your product was properly produced and conformed with your standard when it left your plant? This problem is made more acute by the fact that your product will usually be mixed by others in equipment over which you have no control, and frequently with products produced by others.

If the evidence of the plaintiff shows, or raises an inference, that the mixture as applied was contaminated or otherwise adulterated, the court may shift to you the burden of showing that it was not

From a talk presented at the Spring Meeting of the National Agricultural Chemicals Association, Houston, Tex., March 24, 1954.

your product which was the offending ingredient. It will be imperative for you to show that your product was not adulterated when it left your plant. What evidence will you have of this?

Product Identity

The first question is one of identification. Can you identify the product? If you cannot identify it precisely, can you narrow the production out of which it came?

Of course, the key to such identification or limitation is the use of batch numbers and retained samples. I recognize that the procedure for batching and taking retained samples may present substantial technical questions, which I will not presume to discuss. It may be difficult to obtain the desired uniformity in a batch. You may assume that the plaintiff's attorney may cross examine closely on the procedure used in batching your production and taking samples.

But these technical problems should not deter you from using batch numbers. Absolute uniformity throughout a batch will not be essential to its admissibility as evidence, although the greater the probability for uniformity, the greater the weight which would be given to this evidence.

How are batch numbers to be used to be of maximum value? The identification of each package by batch number is, of course, the most apparent and probably the most rewarding use of batch numbers. If the container of the questionable product is still available at the time the product liability action arises, the answer is simple. All necessary tests can be performed with the retained samples. Frequently, additional packages from the same batch can be located in the hands of other users.

Use of Batch Numbers

But frequently the container has been destroyed by the time the action arises; therefore, the number of the questionable batch cannot be traced from the container. Does the use of batch numbers have any value in such a situation? It can have real value if the nature of your product and the method of distribution is such that it is practicable to record batch numbers on your shipping documents and invoices.

If the product is shipped directly by you to the user, the designation of the batch numbers on the shipping documents may enable you to identify the questionable batch precisely, even though the container has been destroyed. If you ship to a distributor, and the distributor sells to the user, the problem, of course, becomes more complicated.

Even in this situation, the designation of the batch numbers on the shipping documents covering your shipment to the distributor may enable you either to identify precisely, or sharply limit the possible batches out of which the questionable product could have come.

I urge you to take all practicable measures to assure the effective use of batch numbers. I know of several recent instances in which the manufacturer was able to establish through the use of his batch numbers that the offending contamination occurred after his product left his plant.

It would be foolhardy for me to attempt to discuss the question of the extensiveness and nature of the control tests which you should adopt as a part of your production routine. That must vary widely for different products. Nevertheless, I would like to emphasize the legal significance of such tests.

It is axiomatic that these tests, in so far as is practicable, should cover all points on which even a small departure from your established standards would affect the performance characteristic of the product. However, once you have determined upon the type of control tests which are to be made, reduce the procedure in writing in the form of instructions to employees.

Control Test Record

Make certain that a record is made of the results of all control tests. These control tests reach their maximum effectiveness as evidence if the jury can be shown the written procedure and the recorded results.

Our discussion has been directed primarily at the product liability facet of research and production control in marketing pesticides. Most of you either heard or have read the excellent panel discussion of pesticide-fertilizer mixtures at the 20th annual NAC meeting last fall. You will recall the discussion of the complex research questions presented by these mixtures—such questions as the persistence of residue in the soil, the possibility of off-flavor, effect on soil organisms and numerous other such problems. You will recall the stress upon the necessity for absolute uniformity in mixture, and the problems of sampling techniques and methods of analysis.

I would like to emphasize the product liability implications of these same problems which at that time were discussed from a regulatory standpoint. The observations made above with reference to the civil liability arising from violation of the statutory requirements of the Federal Insecticide, Fungicide and Rodenticide Act and the counterpart state laws are equally applicable to the requirements of the various state fertilizer laws.

I would be remiss in my obligation if I failed to caution against the civil liability implication of these hazards and urge the necessity of research and control measures commensurate with the importance of these questions.

Conclusion

May I conclude my excursion into the realm of pseudo-science with the frank admission that I have only scratched the surface of this important subject. If this discussion has helped to make you aware of the legal implications of research and production control; if it has impressed upon you the fact that planning your research and production control program should be a joint undertaking between your technical personnel and your counsel, it will have served its purpose.

If it has accomplished these purposes, then I am confident that your technical personnel, in conjunction with your counsel, will take up where this discussion leaves off, and adapt to the needs of your particular operation a research and production control program equal to the task of defending your "poorest possible position" should you become mired in the technicalities of product liability litigation. ◆

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Making Guesstimates On Insect Losses

By George C. Decker

Entomologist

Illinois Natural History Survey and Agric'l Exp. Station

The term "guesstimate" is admittedly vague and apparently undefined, but perhaps more than any word in common usage it does most accurately indicate the type of information we now have on insect damage or losses. At best, the information available today is vague, inaccurate and can truly be designated as a sort of hybrid obtained by combining crude estimates and wild guesses.

Paucity of Data

Entomologists have for years lamented the paucity of data on insect losses and have long recognized the inadequacy and unreliability of such data as has been available. In 1891, James Fletcher devoted much of his presidential address before the American Association of Economic Entomologists to the general subject of insect damage and the need for more accurate data on crop and other losses attributable to insects.

From time to time others, including L. O. Howard, C. L. Marlatt, J. A. Hyslop and J. R. Parker to mention only a few, have in their turn asserted that in self defense the profession should develop sound, defensible statistics on the extent or magnitude of insect-induced losses. There is nothing I could say that you will not find in the writings of these great leaders of the past. In fact, Fletcher's address of 1891 could, with equal propriety, be given here today.

Presented at the North Central Branch meeting of the Entomological Society of America, Omaha, Neb., March 26, 1954.

Whether my remarks of today will bear any more fruit than did those of my predecessors remains to be seen. In this regard may I briefly allude to one penalty we are now paying for our sin of omission, and then express the hope that we may soon see some evidence of repentence and appropriate reform.

As of today there are more people in the United States who worry about vague and often imaginary hazards presumably associated with the use of insecticides than there are who worry about insect losses or the importance of insect control problems. That is because we, as entomologists, have failed to adequately evaluate insect damage and to properly acquaint the general public with the magnitude of insect losses, the value of insect control and the importance of insects as man's principal competitors for practically every material possession we produce, possess or desire—our food, our clothing, our health and at times even life itself.

Toxicology Exploited

The toxicologists, on the other hand, have done a much better job of selling their wares. However, we must concede they have received excellent help from a small but powerful group of ill-advised or unscrupulous fear mongers. In pursuit of headlines and false glory, the latter group, recognizing the publicity value of even meager unfavorable toxicological data, have exploited it to the hilt, and thus we find the general public apprehensive and more or less hesitant to support sound insect control programs.

Economic entomology has made much progress since the birth of professional entomology in the United States just 100 years ago. However, it is perhaps unfortunate that changes came about so gradually that the public and even some entomologists failed to recognize the enormous improvements that were made. All too often we erroneously regard the present status of many insect pests as normal and representative of the past. For some unexplainable reason we seem to have lost sight of the fact that in colonial and pioneer days insects ran rampant and farmers were hard put to produce enough food and fiber to supply their own families and one or two city dwellers.

Those who are in doubt as to the status of insect losses in years gone by should go back and read the daily papers and the agricultural magazines of 50 to 100 years ago. Observe that thousands of homesteaders in the Great Plains areas were driven from their land by grasshoppers and chinch bugs in the 1870's and '80's. Note that between 1855 and 1865 farmers' letters on the ravages of the Colorado potato beetle were almost pathetic.

Also from time to time the entomologist, the farmer and the consumer alike might do well to recall that the American pioneer, like present day inhabitants in many parts of the world, ate wormy fruit and insect-infested vegetables and cereal products with relish, unmindful of the fact that within 100 years our progress would be such that American market standards and governmental regulations would prohibit the sale of such produce. Jokingly he made excuses for quality: "Let the apple worm look out for himself;" "A

few aphids in the spinach is better than no meat at all;" but it is evident that the public generally accepted the presence of insects in fruits, vegetables, cereal products and the like as inevitable.

Couldn't Be Sold Today

The fact remains, however, that produce of 1900 could not be sold on today's market. There are those who may question the wisdom of or the necessity for some of our present day market standards, but it is doubtful if the American housewife, having once seen quality produce, will ever again accept anything less. In this connection we must recognize that sanitation and food standard requirements are constantly becoming more stringent, not more liberal, which means that insect control must improve or insect losses will become progressively larger. Undoubtedly we shall, as we have in the past, meet the requirements of each new standard as it is imposed.

However, unless we collect the necessary data and publicize the facts as we go along, the public will again accept all of the improvements made in a very matter of fact manner that will reflect little or no credit to the entomologists and the other scientists whose efforts make this progress possible.

When major insect outbreaks of great national importance occur, the resulting damage is often so conspicuous it cannot be overlooked or ignored, even by the most disinterested layman. When thousands of acres of crops are completely destroyed, it is not too difficult for anyone to prepare damage estimates that will be accepted without undue criticism or ridicule. Under such conditions entomologists and other agricultural leaders have from time to time developed some impressive if not completely reliable data on the magnitude of insect losses, but there is little if any quantitative data on the actual or probable extent of the insect losses which occur annually under so-called normal or average conditions.

10% Destruction

A little over 60 years ago, Fletcher, perhaps with fear and trembling, suggested that insects might annually destroy as much as 10 per cent of our entire agricultural production. Practically all estimates made since that time have been based upon this figure or at least are more or less in accord with it. However, there is little or no concrete data to either support or challenge such estimates. Some consider these estimates as exaggerated or excessive, whereas others regard the 10 per cent factor as absurdly low. I have long since cast my lot with the latter group.

In a paper presented at Los Angeles last December, I repeated an assertion of a naturalist whose identity has long since been lost, "The total mass of protoplasm produced by insects each year exceeds that produced by all other terrestrial animal life put together." It was fully expected that such an assertion would draw considerable fire, but to date the affirmative comments from specialists in various branches of science have far exceeded the criticisms from any source whatever.

Perhaps we entomologists have been ultra-conservative. I often wonder how many times we stop to consider how many insect pests, individually or collectively, may attack practically any or every crop at some time during the growing season.

All too often we are apt to inspect a crop on some particular day, make limited observations on one or two species that attract more attention than the others, speculate that this may represent an unusual condition, guess at the degree of probable damage, guess at the acreage imvolved and then finally guess that perhaps two, four or eight per cent of the total crop has been damaged or lost. Sometimes we completely overlook what happened in that same field and in similar fields on the other 174 days of the growing season.

How often do we fully consider all that may take place in a corn field between May and October? Insects may attack the seed before it germinates; a dozen species may individually or collectively damage the root system. Still others may attack the juvenile seedling plants, and a wide variety of species may attack the mature foliage, tassels, main stalks, and even the ears of the plant.

True, all species are not apt to be abundant every year, and it would probably be unusual to find all species represented in any one field at any given time. Damage attributable to any one insect may be low, but the combined effect of all the insect activity in any given field from spring until fall, accurately measured, might be appalling.

Perhaps we may find it impractical or even impossible to measure precisely insect damage as it occurs

Table 1. A Summary of Estimates by Entomologists and Growers on the Necessity for and Value of the Use of Insecticides in Food Production.

	Per cent of present normal commercial crop that could or would be produced without the use of insecticides		Commercial Production Only Considering average or normal insecticide usage			
			Per cent of crop treated		Per cent of crop lost due to insects	
Crop	Ento-mologists	Growers	Ento-mologists	Growers	Ento-mologists	Growers
Apple	10	4	93	98	15	16
Peach	9	3	91	99	14	17
Cherries	34	10	91	83	7	10
Grapes	42	4	70	98	11	11
Strawberry	68	64	39	43	11	16
Cabbage	23	12	89	95	12	12
Onions	37	35	47	90	8	10
Beans	58	30	48	75	12	15
Tomatoes	68	68	49	63	12	18
Potatoes	37	18	92	88	12	28
Oats	96	65	7	25	3	10
Wheat	96	90	1	40	5	13
Corn	93	80	6	9	6	18
Legume Hay	81	65	14	10	21	25
Clover seed	80	50	10	21	28	50

Table 2. Average (United States) per acre yields of ten truck crops for five years before and after DDT came into general use in 1946.

Crop	Criteria of yield	Yields 1941-1945	Yields 1947-1951	Per cent increase or decrease	Insecticide usage
Pimientos	crates	1.17	1.13	-3.25	scant
Beets -mkt.	bushels	181.20	184.80	1.99	scant
Peppers	bushels	216.60	228.60	5.54	scant
Eggplant	bushels	231.00	245.80	6.41	scant
Cabbage -mkt.	tons	6.90	7.72	11.88	extensive*
Sweet corn	tons	2.39	2.74	14.81	extensive
Cauliflower	crates	291.60	348.00	19.34	extensive*
Onions	sacks	276.00	332.40	20.43	extensive*
Celery	crates	446.20	628.00	40.74	extensive*
Potatoes	bushels	141.50	228.88	61.75	extensive*

* Crops extensively treated prior to 1946.

under specific conditions in the field, but there is no justifiable reason for our continued failure to obtain some sort of reliable estimates of insect damage both in terms of specific pests and in terms of crops or other collecting groupings. Certainly there are many ways in which readily obtainable data, statistical method sand sound logic may be combined to provide reasonably accurate estimates for practically any or all types of insect damage.

Surveys Made

Surveys involving the distribution of questionnaires have been most extensively employed to develop such data as are now available. These surveys have very obvious limitations. Every extension entomologist has on numerous occasions participated in surveys of this type, and he knows full well that the value and usefulness of the data obtained are largely determined by the qualifications of the individuals who provide the raw data.

In most cases the validity and probable accuracy of an individual's estimate will be closely correlated with the extent of his agricultural experience and his familiarity with the specific problem in question. In a preliminary study of this type the writer found that if questionnaires were sent out promiscuously the estimates for each and every item might be expected to run almost the complete range from 0 to 100, but that when questionnaires were sent only to a selected group of specialists working in close contact with field problems, the estimates fell into a much more limited range and there was usually reasonable agreement in the estimates made by independent groups.

Estimates on insecticide usage and insect losses for 15 crops obtained from 10 entomologists and 10 farmers specializing in the production of the particular crops mentioned are summarized in Table 1. In general, estimates made by the entomologists were more conservative than those made by the growers and it may be noted also that in general estimated losses were in excess of the old 10 per cent figure.

One may also find some interesting trends through a study of available Federal crop statistics. We are all aware that when DDT became available for commercial use in 1946, it was used extensively on many crops to attain a degree of insect control heretofore practically unknown. Did we increase crop yields? Research workers' experimental data said yes, but the average citizen took a skeptical view because from his standpoint the research man is obviously biased.

DDT on Potatoes

Well, let us take a look at the crop statistics. DDT was widely used on potatoes and onions, so let us see what happened in the production of these crops. Taking the average production for the five years prior to the advent of DDT (1941-45) as a base, let us look at the annual production figures for the ten year period 1941-51. In both cases production seemed to turn abruptly upward in 1946. In five years time onion yields increased over 40 per cent and potato production nearly doubled.

Of course, these increases may have been due to other improved practices, but why the upturn in 1946? Also, what about the evidence presented in Table 2. If the increases were largely due to other factors, they should have been fairly general across a range of crops, but here it appears that the increased yields were more or less proportionate to the extent of insecticide usage.

It may be noted, also, that in both cases the trends are still upward in 1951, the last year for which statistics were available, indicating ultimate yields may still go higher. Alfalfa seed production seems to be a case in point. In many areas the use of insecticides in alfalfa seed production fields has not become a widely accepted practice, and therefore average yields for the nation as a whole have reached only 160 per cent of the pre-DDT level, but in the western states where DDT is used more extensively, increased yields have been phenomenal, ranging up to well over 400 per cent in the state of Washington where all acreage has received one or more treatments since 1948.

Better Estimates

The methods suggested above will at best develop only crude estimates or broad guesses which the Program committee so appropriately referred to as guesstimates. We can and we must do much better. For example, in experimentation we frequently compare yields in treated and untreated plots as a means of measuring the gains attributable to insect control.

Now by going one step further and including accurate population studies in such experiments we can develop data which, when combined with good quantitative survey data, will permit the projection or extrapolation of loss estimates to cover large areas, entire states or the nation as a whole. This has been done more or less effectively in the case of the European corn borer.

In 1918, Morrill measured the food requirements of the differential grasshopper (*M. differentialis*) and then calculated that 7½ adult hoppers per (*to page 55*)

Phillips Adds NH_3 Plant At Adams Terminal Site

Phillips Chemical Co. has added a new ammonia plant to its chemical manufacturing units at the 840-acre Adams Terminal site, about eight miles southeast of Houston, Tex. on the ship channel. The plant has a design capacity of 450 tons of anhydrous ammonia per day which more than fills the ammonia requirements of the ammonium sulfate and methylvinylpyridine plants there. The remaining production is distributed to agricultural customers for direct application to the soil or for use in mixed fertilizers and to industrial customers for various uses including manufacture of nylon.

For more than five years, Phillips Chemical, a wholly-owned subsidiary of Phillips Petroleum Co., has been operating the government-owned Cactus ammonia plant near Dumas in the Texas panhandle. The major portion of this plant's production is directed to the needs of agriculture in the form of prilled ammonium nitrate, nitrogen solutions and ammonia. An appreciable portion is moved to manufacturers of explosives and nylon. In response to the rapidly expanding use by farmers of fertilizers, Phillips now has doubled its previous production of ammonia.

Construction of the new plant near Houston began in late 1951 and was completed in December, 1953. It provides faster delivery of ammonia to many Phillips customers who have heretofore received shipments from the plant near Dumas, Tex. Facilities at Adams Terminal for loading barges and seagoing vessels speed delivery of ammonium sulfate and other fertilizer products to customers who can be served by water transportation.

Ammonia at Adams Terminal is made from natural gas and air. The gas is obtained from vast reserves owned by Phillips Petroleum and is delivered to the plant through a 30-mile pipeline from the company's Chocolate Bayou gasoline plant.

Another important element in the Phillips fertilizer line has been added with the starting of a new 405 ton per day triple superphosphate plant at Adams Terminal.

General Description of Ammonia Manufacture

Natural gas is mixed with steam and reacted over nickel catalyst in reforming furnaces to produce hydrogen. A controlled quantity of compressed air is added to the hot reformed gas to produce a mixture of hydrogen and nitrogen suitable for making ammonia. Oxygen is consumed by reaction with hydrogen, and methane is reduced to a fraction of a percent by reforming in a second bed of catalyst. Iron oxide catalyst promotes the reaction of carbon monoxide and steam to produce carbon dioxide and hydrogen.

Reformed gas is cooled by direct contact with water and passed directly to a monoethanolamine absorber where carbon dioxide is removed. The rich monoethanolamine solution is regenerated with steam, cooled and returned to the absorber.

Reform and CO_2 Removal Sections

The reform and carbon dioxide-removal sections of the plant are divided into three separate trains each designed to produce the equivalent of 150 tons of ammonia a day. From these units all gas enters a common header leading to nine reciprocating compressors. Engines rated at 2200 horsepower each and which use natural gas for fuel, compress the process gas to 1850 psig in four stages.

A common header from the compressors leads to the carbon-monoxide removal section which is divided into two trains. Carbon monoxide is removed from the gas in an absorber by countercurrent contact with a water solution of copper ammonium formate and carbonate. The solution is regenerated with steam, cooled and returned to the absorber.

A fifth stage of compression raises the pressure of the process gas about 5000 psig. The makeup gas is passed to the ammonia synthesis section, divided into three trains. The mixture of hydrogen and nitrogen is passed over a promoted iron catalyst to produce ammonia which is then condensed, separated from the gas and run to storage. Uncoverted synthesis gas is recycled to the catalyst bed. In the storage area liquid ammonia is weighed in any of four 30-ton scale tanks and stored in any of four 1000-ton refrigerated spheres.

Ammonia is recovered from all waste gases by absorption in water and separated by distillation. The distilled product meets specifications for refrigeration grade ammonia.

The plant has facilities for shipping ammonia in cylinders, trucks and railroad tank cars.

Steam at 335 psig and 585°F is produced in three boilers each rated at 150,000 pounds per hour. Water is treated by acidification, aeration, hot process softening with hydrated lime and magnesium oxide, filtering, ion exchange softening and deaeration. Raw water is supplied from wells on the plant site.

Separate cooling water systems are provided for the reforming section and carbon dioxide-removal section. A third installation services the remainder of the plant. Cooling towers have induced draft fans. Cooling water is treated with chlorine, sulfuric acid and

a corrosion inhibitor. Acid injection is controlled automatically by a *p*H instrument.

Gas for purging equipment is provided by an inert gas generator which produces nitrogen that is free of oxygen and carbon oxides. Air at 125 psig for operation of tools is piped throughout the entire plant.

Special Features

Rupture discs are installed on secondary reform chambers where air and hydrogen are mixed under conditions that might produce an explosion. The discs are 20 inches in diameter and designed to withstand 60 psig at 350°F. Two rupture discs are mounted in series and are protected by a radiation shield and steam blanket. Protection of the equipment by a water seal was not possible as the necessarily large volume of water would move too slowly to avoid damage in the event of an explosion.

Reformed gas leaves the reforming section at 20 psig whereas a pressure of a few inches of water is common at this point in other plants. Operation at higher pressure saves considerable investment in compressors and a gas holder. Higher pressure has only a slight effect on the extent of reforming.

Centrifugal compressors are used in an ammonia refrigeration system which cools copper liquor in the carbon monoxide-removal section, condenses ammonia in the synthesis section and cools ammonia in the large storage spheres. Liquid ammonia is injected between stages of the compressors to provide cooling. This is believed to be the first use in the United States of centrifugal compressors in an ammonia refrigeration system.

The synthesis converter for the catalytic reaction of hydrogen and nitrogen to form anhydrous ammonia is 40 inches in diameter and is fabricated from laminated steel to withstand an operating pressure of 5000 psig.

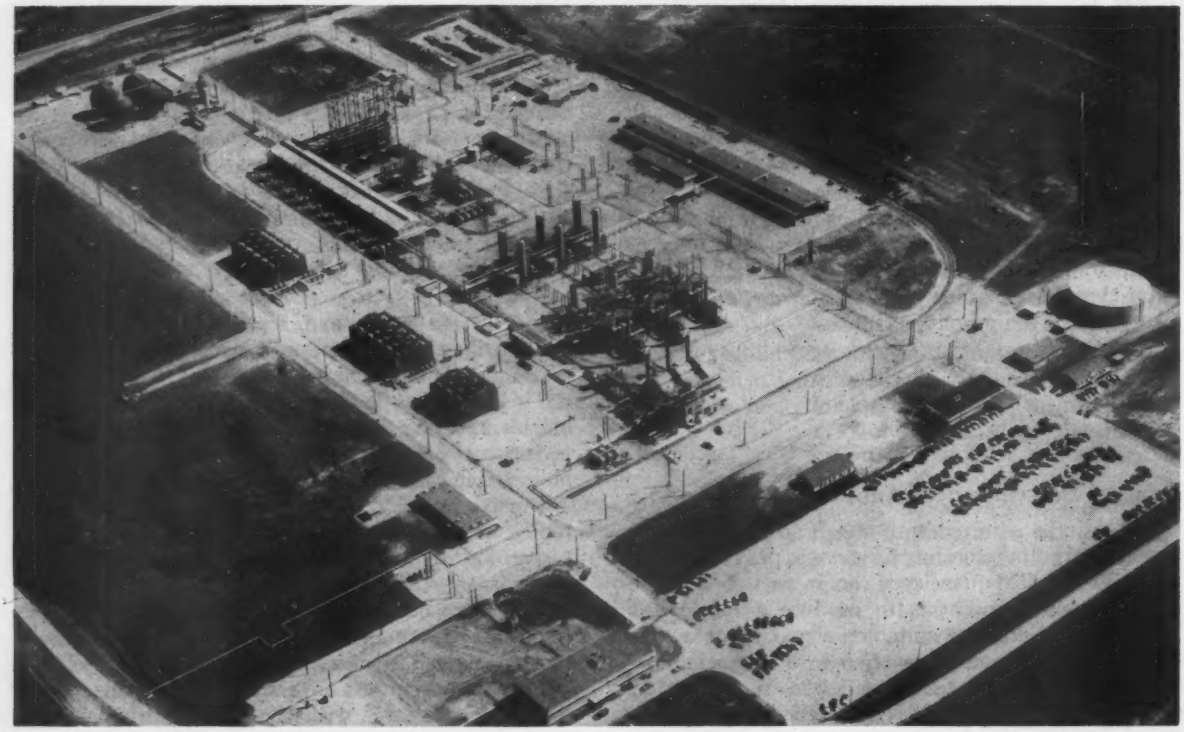
Liquid ammonia is moved by multi-stage centrifugal pumps rather than reciprocating pumps. Less leakage occurs through the mechanical seal of a centrifugal pump than through the packing of a reciprocating pump.

The new plant incorporates the latest in automatic process controls of both electronic and pneumatic types. Most of the systems transmit data to a central control room where both miniature and conventionally sized instruments indicate, record and provide means for the operator to control the process.

Compositions of gases at critical points in the plant are determined by modern automatic instruments. Sulfur content of natural gas is continually analyzed and recorded. Hydrogen, methane and carbon oxide compositions are recorded by separate infrared analyzers. Several of the infrared instruments were designed and built by Phillips Petroleum Co.

Modern Roman-brick buildings, air conditioned in most instances, provide comfortable working space throughout the plant. Facilities include a two-story office building for general administration and a separate one-story office building for maintenance supervision, a large central laboratory with space for development work and a separate laboratory building for process control, fire station with annex for first aid treatment and safety meetings, gate-guard house and change-clothes house. Pump houses and chlorinator buildings are of the same modern design. About 21,000 square feet of shop facilities and over 14,000 square feet of warehouse space are included in a single structure of steel and transite. ◆

Phillips NH_3 plant, newest addition to the Adams Terminal plant facilities, was designed to produce 450 tons per day.



Press Tour Marks Opening of

New Hercules Powder Lab

New Agricultral Chemicals Laboratory of Hercules Powder Co. in Wilmington.

Hercules Powder Co. officially opened a new Agricultural Chemicals Research Laboratory on April 8. According to Paul Mayfield, general manager of Hercules' Naval Stores' department, the facilities will permit scientists to screen more than 300 formulations a month.

The new facilities, located adjacent to the Hercules' Experiment Station, include a main building, greenhouses and field test plots. Dr. E. N. Woodbury heads the laboratory staff of 18 which includes entomologists, plant pathologists, plant physiologists, agronomists and horticulturists.

Lab Equipment

Specially designed equipment utilized in the lab includes a herbicide sprayer which runs on an overhead trolley to simulate field application.

Another feature is a unique air-conditioning system. Air pressure in each test room is lower than that in the hallways so that when the door of a test room is opened air from within will not flow into the hall and into another room.

No air from any of the rooms is recirculated and where air temperature and humidity conditions are critical, they are held to narrow limits to assure uniform growth of test organisms and uniform test conditions.

Constant temperature and humidity rooms provide uniform conditions for raising insect, fungi or bacteria cultures. Test rooms, similarly controlled, are used for application of experimental chemicals. Separate transfer rooms for handling of specimens are also included.

Greenhouses, equipped with automatic controls, are used to grow a variety of plant material for evaluation of the chemicals. Additional facilities include special rooms for the rearing of houseflies, Mexican bean beetles, southern armyworms and pea aphids.

Press Tour

A press tour marked the opening with representatives present from a number of industry and farm publications. The group was greeted by Monty Budd, director of advertising, and was then shown the excellent Hercules movie, "Pollination of Alfalfa."

After a buffet lunch at the Hercules clubhouse, the group was conducted through the laboratory in groups guided by R. T. Yates, R. J. Both, A. D. Lohr and R. M. Ritchie.

Representatives from various USDA branches were scheduled to visit the facilities on the following day. ◆

Chemicals Laboratory Facilities

Formulation Room—Insecticides & Fungicides
Fungicide Laboratory
Fungicide Equipment Room
Transfer Room
Tropical Room
Herbicide Formulation Room
Herbicide Spray Room
Fungicide Room
Herbicide Test Room
Greenhouse Headhouse
Housefly Rearing Room
Main Insect Rearing Room
Pea Aphid Room
Spray Room
Post-Treatment Holding Room.

Dr. E. N. Woodbury, supervisor of research at the lab, checks progress of test work on herbicide formulations.

Hercules Agricultural Products

Fertilizers: Ammonium nitrate, anhydrous ammonia, ammonium sulfate and ammoniated solutions.

Pesticides: Toxaphene and Thanite insecticides.

Soil Conditioners: Soil conditioners based on a special type of Hercules CMC will be available this year.

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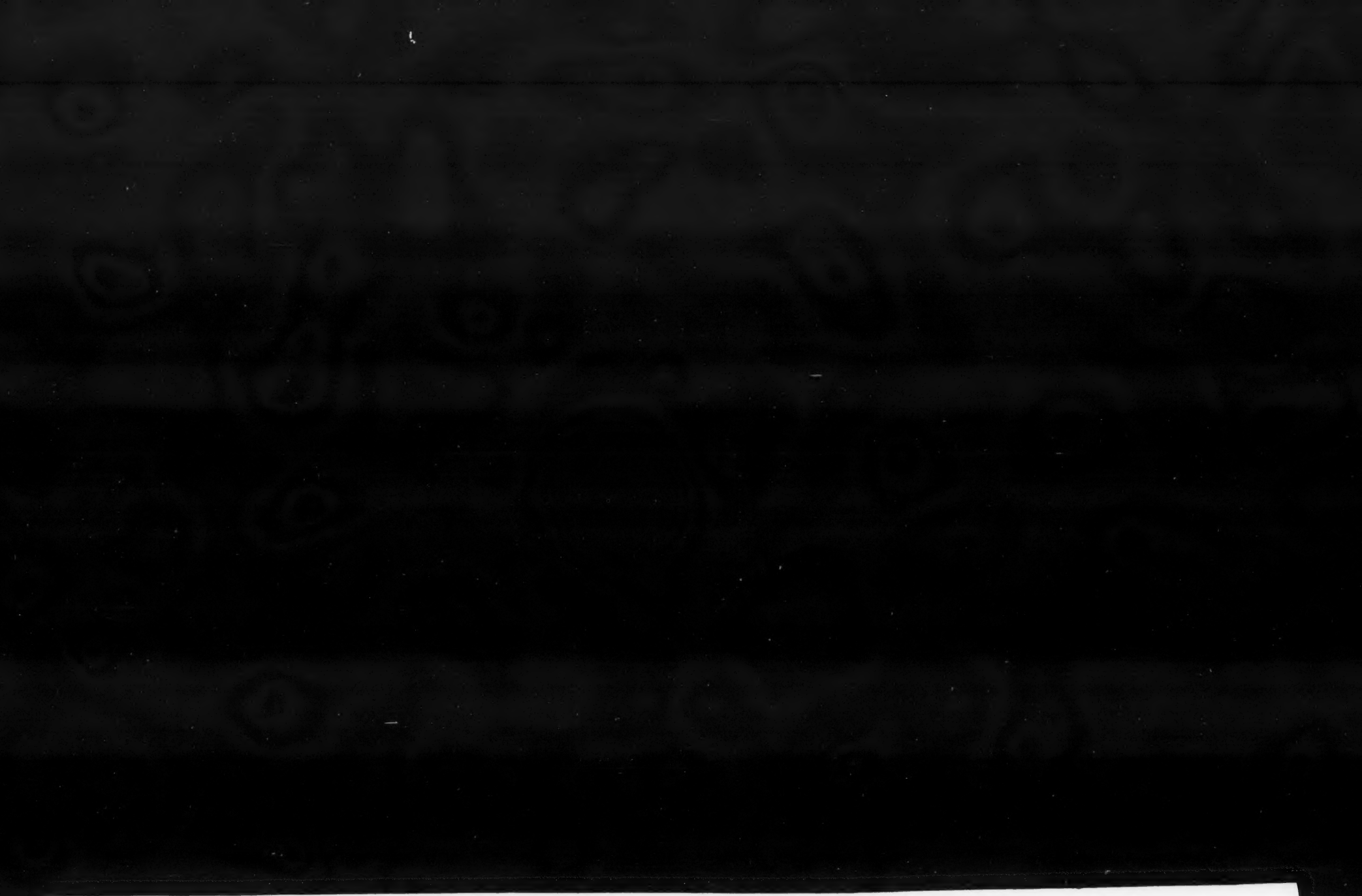
Sewn Valve
Pasted Valve
Sewn Open Mouth
Pasted Open Mouth
Flat Sewn Open Mouth
Flat Sewn Valve
1 Responsibility
2 Integrated Plants
3 Generations of Bag Experience
Gilman PAPER CO.
• St. Marys Kraft Corp.
• Gummed Tape Div.
• The Gilbreath Corp.
• Kraft Bag Corp.



the Future of the Fertilizer Industry

By Harold E. Myers
Associate Director
Kansas Agricultural Experiment Station

IN THE development of this topic some may expect me to dwell on the increasing need for food and fiber to sustain the increasing population of the world which today has reached a total in excess of 2¼ billion people.

In the United States, the increase is at the rate of four people per minute which is expected to result in a total population of about 190,000,000 by 1975. If the world population were to increase at the same rate, the total in 1975 would be about 2,865,000,000. The population trend is a significant factor in our look ahead.

Of even greater significance is the dietary level of people as they exist in the world today. It has been estimated that in pre-World War II days, 69.4 per cent of the world population received an average of 2,700 calories or less of food energy per day, while 77.9 per cent received 30 grams or less per day of animal proteins.

It has been estimated also that on the basis of the world grain supply only 920,000,000 people could be supported on the North American standard of living. This number is about 40 per cent of the people now populating the world. On the Asiatic standard 2,954,000,000 people could be supported. This figure is just a little larger than the above estimate of world population for 1975.

The Americans and certain other people of the world have no desire to witness a gradual decline in the standard of living to a level no higher than that experienced in large areas of the world today.

Relationship to Industry

The population in relation to the potential food supply poses a serious question that no one should brush off lightly. It does have a relationship to the future of the fertilizer industry in the United States. However, it also is a political problem involving world trade and other factors.

H. E. Myers

No attempt is being made to minimize the relationship of the fertilizer industry to the sociological problems of the world. Yet so little can be done about the problem below the level of international politics that I will not deal with it further.

Demand Caused Expansion

The tremendous expansion in the productive capacity of the fertilizer industry of the United States resulted from the immediate demand for fertilizer materials. The prospect of a continued high demand in the future added confidence to the expansion program but was not the cause of it. The trend in population is only one factor, probably a minor one, indicating a continuing high demand for the products of the expansion program.

Of much greater significance is the demonstrated economic need at present economic and population levels for the repeated addition of greater quantities of fertilizer materials both in areas where fertilizers are used sparingly and where they are used abundantly.

It is well that the fertilizer industry did not justify its increased capacity in order to solve the theoretical short food supply of 1975. Today with the population far short of that expected in 1975 and despite people being hungry in many parts of the world, the nation is face to face with surplus grain and fiber. It has been estimated that the use of fertilizer and lime contributes about 25 per cent to the total agricultural production in the United States.

Additional fertilizer use, where needed, will increase production and therefore may contribute to the surplus problem. It is not wise to negate the immediate surplus problem by emphasizing the need for increased quantities of food and fiber in the future. The continued

Presented before the Industry-Agronomist meeting of the Middle West Soil Improvement Committee, Chicago, Ill. on Feb. 19, 1954.

use of a contributor to the surplus problem must be justified in terms of the conditions as they exist today.

Economical production of high quality crops is the justification for the continued use of fertilizers in face of mounting surplus crops. To reduce the surpluses by eliminating the use of fertilizers would not be sound agricultural economy nor in the best interest of a widespread, sound rural economy. Crop surpluses should be dealt with by other methods, possibly by curtailing total production and not by limiting production per acre. The latter usually results in less economical production.

Applied Research

The past development of the fertilizer industry has been the result of the application of research in manufacturing technology and in fertilizer use. The future development will be dependent upon the application of additional research results.

Changes in the fertilizer industry in the past few years have been very great. As an example, ammonium nitrate and anhydrous ammonia, almost unknown as fertilizer nitrogen carriers 15 years ago, now dominate the nitrogen industry. Methods of manufacture have improved greatly. These and other changes resulted from the application of research. The rate of change has been proportional in a general way to the amount of effort put forth in the research program.

Future Improvement

If research of the same magnitude is continued in the future it is expected, confidently, that the improvements will be as great in the future as they have been in the past. If the amount of research is stepped up, it should be anticipated that the changes will be even more rapid in the future. The fertilizer industry should be expected to carry a larger part of the research load in the future. It has an obligation to see that an appreciable portion of its profits are put into research designed to improve the efficiency of its product as used by the farmer.

The fertilizer industry should support basic or fundamental research in areas relating to the industry. By basic or fundamental is meant research designed to elucidate the laws of nature. Here is an industry with a firm footing in basic research. The industry as we know it today could not have developed unless someone had looked for, found and characterized the elements, especially nitrogen, phosphorus and potassium. Someone had to determine the laws pertaining to the behavior of gases before nitrogen could be fixed from the air. Catalytic action had to be understood. The law of mass action had to be understood before various compounds could be manufactured from rock phosphate.

The need for basic research is in three fields:

1. In the area relating to technology;
2. In those little understood boundaries where soil chemistry, plant nutrition and plant physiology meet, to the end that we may be able to calculate the complete nutrient requirements of the soil for the economical production of high quality crops and
3. In the realm of the relation of fertilizer balance and imbalance to the quality of crops as indicated by chemical assay checked against animal response.

The fertilizer industry has a significant responsibility to learn how to put soil fertility and plant nutrition together most effectively for the production of high quality food.

Research in Techniques

Research in the field of fertilizer manufacturing techniques is going ahead to an extent never before witnessed. Near revolutionary changes in the manufacturing process may be expected in the future. New and better equipment with labor saving devices will come with research.

The development of the nitraphosphates; the electric furnace process in making phosphorus and phosphoric acid; improved methods of nitrogen fixation; studies on the blending of anhydrous ammonia, ammonium nitrate, triple superphosphate and muriate of potash; development of liquid fertilizers and efforts to develop a low cost process for the manufacture of nitric acid are only a few examples of technologies on the horizon that may have marked effects on the fertilizer industry.

One of the most obvious future adjustments will be the lowering of the price of fertilizer materials. Improved technology will tend to bring this about. But of even greater importance is the fact that only now is supply beginning to catch up with the demand which was such that fertilizers were sold with little sales effort. Competition should further depress the price.

The future will present to the industry a greatly enlarged opportunity to be of service to the consuming public. If the industry accepts the challenge, the United States should continue to enjoy economical production of high quality food in abundance.

Improve Soil Tests

Continued improvement in the soil testing program should be an important factor in the ability of the industry to be of service to the farmers. As the soil tests improve, the dealers and salesmen will be able to fill soil prescriptions as needed. The dealer should help the farmer understand his and other fertilizer problems much more thoroughly than he now does. This means a more enlightened dealer and one who sells his product for what it is in relation to the farmer's need.

Dealers render a service by selling only those nutrients which are needed. To sell lime through the fertilizer bag to correct an acid residue in the soil resulting from fertilizer is an expensive way to apply lime. Furthermore, to add calcium sulfate to all soils because some soils need sulfur is not rendering the high level of public service which should be expected of a responsible industry.

Every manufacturer should produce a quality product—a product in which he himself will take pride. In the future, quality of product should play an even greater part in the sales program than it does today.

Intensify Sales Programs

The future offers an opportunity to expand the consumption of fer-

tilizers by intensifying the sales program in those areas where crop response and economic studies show a possibility for an expanded market. This tremendous possibility for greatly enlarged sales is based on information available today.

Fertilizer use should continue to expand. In only a few instances, involving a few crops and small areas, has the economic ceiling of use been reached. If all farmers used 100 per cent of the fertilizer amounts recommended by the land grant colleges and the USDA, the fertilizer industry would not have sufficient plant capacity even after present expansion program is completed. Any trepidation which the fertilizer manufacturers may hold for the future of the industry is based on factors other than the real need for fertilizer.

The USDA-Land Grant College—Industry committee on efficient use of fertilizer and lime is in part at least a recognition of the fact that farmers are not using fertilizer to the level of their economic feasibility. This committee should be continued until the situation is reasonably well corrected.

The future of the industry is contingent on how well farmers follow the fertilizer recommendations of their experiment stations and USDA. Future recommendations should include economic and farm management information to a greater extent than has been true in the past. Recognition must be given to the fact that fertilizers are an indispensable part of various management factors necessary for high yields, but that they do not eliminate the need for other good soil management practices.

High-Analysis Trend

It is anticipated that there will be a continuing trend toward higher analysis fertilizer materials. Much progress has been made in this direction. The national average in 1951-52 was a total plant food content of 24.86 per cent.

Material carrying 100 per cent plant food content does not appear to be outside the realm of possibility. TVA is studying ammonium metaphosphate carrying about 20 per cent nitrogen and 80 per cent available phosphoric acid. If such a high analysis material is actually realized, it may give added impetus to the change in the method of expressing nutrient content of fertilizers.

Land grant college and USDA personnel have long advocated higher analysis materials. Industry has moved slowly in accepting the recommendation, partly for economic reasons. It is interesting to note that all industry people polled recently on the question favored higher analysis material. Only one person cautioned that we might be overdoing the high analysis trend. He was a USDA man.

There are several factors which make still higher analyses appear reasonable. The greatly increased triple superphosphate capacity and the recovery of uranium during the manufacturing process adds to the supply of a high analysis component of the mixed fertilizer with the uranium justifying some of the production cost.

Manufacturers of normal superphosphate can use liquid phosphoric acid in their standard equipment for making high-analysis phosphate material. This may be a decided advantage over the purchase of such material. It constitutes an important reason why the trend to higher analysis material is expected to continue.

The tremendous increase in the quantity of high analysis nitrogen carriers, urea, anhydrous ammonia, ammonium nitrate and nitrogen solutions offers possibilities of still higher analyses of mixed fertilizers whenever the technical problems relating to their use have been solved. The increased use of ammonium phosphates will add greatly to an elevation of the analysis. Likewise, nitraphosphates, if used extensively—possibly with potassium added—will up the average analysis over that which exists today.

'Squeeze Is On'

Some low analysis materials will be with us for a long time, but the squeeze is on. Low analysis superphosphate, both as a straight good material and as a constituent of mixed fertilizer, will find its area within a small radius of the producing plant. Nitrate of soda won't be found very far from the dock onto which it is unloaded.

Secondary and trace nutrients will continue to increase in importance. The continued use of NPK and lime, with resulting high yields, will eventually result in a depletion of the soil reserves of other nutrients. The trend toward higher analysis fertilizer materials is also a factor in this regard. Magnesium, boron, copper, manganese and zinc are the nutrients which will be of greatest interest to the industry.

Liquid Fertilizers

The future should witness a marked increase in the use of liquid fertilizers. There has been a definite trend in this direction. It is hard to answer affirmatively a question as logical as this: Should one process a liquid into a solid when the solid has no specific virtue? This applies especially to anhydrous ammonia and various nitrogen liquids but also has application for mixed fertilizers as well.

Bulk Spreading

Bulk spreading of fertilizers is developing rapidly and may become the chief method for fertilizer distribution. If bulk spreading does become a principal method of fertilizer distribution, it will be a case of economy and ease of distribution offsetting efficient use of fertilizers by the crop. As the trend proceeds toward bulk spreading, are we throwing out of the window all of the fine work relating to placement? Is bulk spreading coming in because our present fertilizer placement machines are inadequate or too laborious and costly?

Bulk spreading offers a number of interesting possibilities. Custom mixing is a possibility. If custom mixing is practiced, the need for mixed fertilizers as we know them today will greatly diminish. Custom blending to a prescription based on soil tests would appear to offer considerable economy.

Maybe even custom mixing and blending will not be needed. Fertilizer distributing machines designed to apply simultaneously as many as three materials at different rates are within the realm of possibility. It should be possible to set a dial indicating the amount per acre to be applied of each plant nutrient. Such a development could

have a marked effect on the mixed fertilizer industry.

After all, why a mixed fertilizer of a given grade? Mixing does not increase the value of the individual fertilizer constituents. A given fertilizer grade probably would not fill the prescription for a soil. Mixing adds to the cost but also adds to the convenience of applying one instead of three different materials.

Fertilizer distribution during slack fertilizer seasons, which bulk spreading would encourage, would be advantageous and should result in lower total cost of fertilization. In order to get many farmers to fertilize out of season, the dealers will have to price the product in such a manner as to make it profitable to do so. The industry people object to two prices during the season. They argue that if the farmer is quoted a low price to encourage him to buy early, he will expect to buy at the same price at the normal time of purchase.

If industry people wish to abide by the principle of only one price per season, then they should start expanding their storage capacity. Without a price incentive, out of season usage will not make much headway. A price incentive for off season distribution of fertilizer materials will come in the future.

Lower Machine Cost

Bulk spreading will not replace row application for "starter fertilizers" applied at seeding time. A reduction in the cost of machines for fertilizer placement should come in the future. The high cost of a combination small grain and fertilizer drill, as an example, is such as to reduce greatly a farmer's desire to purchase the equipment.

Bulk spreading is adapted when large quantities of fertilizer are used and where the practice is to fertilize the soil once for several crops in contrast to applications for each of several crops. Long term investment in soil fertility is in general a sound investment for phosphorus and potassium. If a farmer has surplus funds of his own or can arrange for the necessary credit, the investment in fertility is logical. When surplus funds lessen and credit tightens, the interest in long term fertilization programs will slacken.

The future will witness a much greater portion of the total fertilizer supply being sold to consumers as straight goods and as chemically manufactured mixed fertilizers. As the soil testing program improves and as prescription fertilization becomes a reality, the efficiency and economy of straight goods for blending to a prescription will become more evident to the consumer. Chemically mixed goods such as nitraphosphates and ammonium phosphates should be used in increasing amounts.

Granulation is Here to Stay

Granulation of fertilizer materials has come to stay. That the agronomist cannot show a clear cut benefit for the granulated product will have no influence in the future acceptance of granulation. The pleasure of handling granulated, in contrast to powdery, material is sufficient advantage to create a strong demand for pelleted fertilizers. Granulation is not as important where bulk handling and custom application is practiced as it is with fertilizers used by individual farmers. However, granulation will certainly facilitate rapid and uniform blending as bulk lots of individual materials are passed out of storage bins through a mixer for delivery into a truck or other conveyance.

The future should witness a greatly increased use of fertilizers on pastures and forage crops and in general on crops used for runoff and erosion control. Pasture improvement is, in general, a figure of speech as far as actual accomplishment is concerned. An adequate pasture fertilization program will do much to make pasture improvement a reality. The fertilization plan to be successful must be a part of sound livestock and grass management programs.

Provision should be made to harvest and store the surplus high quality feed during periods of peak production. Pasture fertilization will do much toward reducing the surplus of grain crops, stabilizing agriculture and reducing runoff and erosion. Grass areas were plowed originally because grass was low in productivity compared to cash crops.

A return to grass will be of short duration unless its productivity is greatly enhanced. An adequate nitrogen fertilization program for grass will reduce the need for legumes in the pasture mixture and thereby reduce or nearly eliminate the bloat hazard which restricts the use of legumes in the pasture program.

Nitrogen fertilization and the use of urea as a commercial feed supplement may reduce somewhat the already inadequate acreage of strong legumes but not seriously. Protein feeds have been so deficient generally in the livestock program that it appears that the use of nitrogen fertilizer for the production of high protein feeds and urea as a nitrogen feed supplement should merely contribute to an improved level of animal nutrition without greatly reducing the dependence on strong legumes. Strong productive legumes are here to stay.

In the future we should expect the plant breeders to give increased attention to the problem of developing crops which can make better use of high levels of fertility. This is not beyond the realm of possibility.

The use of insecticides in fertilizers offers considerable promise for controlling soil insects. The remarkable success in controlling corn root worm by this method is encouraging for greater success in the future.

Future Use of NPK

In the future the younger men in this group today will, in discussing fertilizer analyses, be using N, P and K instead of the conventional N, P_2O_5 and K_2O. Then someone in the group will say, "I remember during the early 1950's listening to Professor Emil Truog, the eminent soil scientist from the University of Wisconsin, extol the virtues of this method of expressing the fertilizer analysis. At that time many of our elders agreed, but because of tradition were hesitant to support the forward step at the time.

"The transition from P_2O_5 to P and from K_2O to K was made as easily during our time as was the transition from NH_3 to N during the time our fathers and grandfathers operated the business." ◆

Making Guesstimates

(*Continued from page 46*) square yard would consume 1/100 of a ton of alfalfa hay per acre per day, or that approximately 17 hoppers per square yard in a 40 acre field would consume a ton of alfalfa hay per day. This same technique could very profitably be employed to obtain similar values for many other pests.

In many instances it should be possible to establish correlations between crop yields and insect abundance just as Patch and his associates did in the case of the European corn borer.

With our national agricultural production approaching 40 billion dollars, by applying the old 10 per cent loss factor we find that insects impose a tax on American agriculture amounting to approximately four billion dollars annually, which is roughly four times the total taxes paid by the farmers of this country on all agricultural real estate and personal property.

Such estimates seem appalling at first, but when we stop to consider that insects consume food equalling five to 20 times their ultimate body weight before reaching maturity and that the mature insects frequently eat their own body weight in food daily for from 10 to 50 days, all things seem possible. Then, recalling that many insects produce several generations a year and that anywhere from one to 40 species may be present on a crop at the same time, we may well wonder that there is anything left for man and his domestic animals. ◆

Summers Opens Sioux City Plant

The new Sioux Falls, S. D., plant of Summers Fertilizer Co. has been in operation since mid-January according to an announcement by J. E. Totman, president.

Totman stated that performance of the complete mixing plant, the only one in South Dakota, was fully up to expectations. Annual rated capacity has been placed at 40,000 tons of complete fertilizers.

The main factory building, of Rilco Arch construction, was designed by Summers' engineers and is 100 feet wide, 300 feet long and 46 feet high. A closed platform, 30 x 48 feet at the northwest corner serves as a receiving dock. Bulk materials received by car are unloaded by payloaders and fed to an elevator delivering to a conveyor belt installation for distribution to storage bins.

On the south side of the building, another platform, 20 x 120 feet, handles bagged fertilizer loaded on trucks. Outbound rail shipments are handled through the north side of the main building.

Stedman Foundry & Machine Co. furnished machinery for the installation which is designed around a two ton mixer arranged to produce a semi granular product. Operating costs are kept at a minimum by power shovels, conveyors and air-actuated equipment.

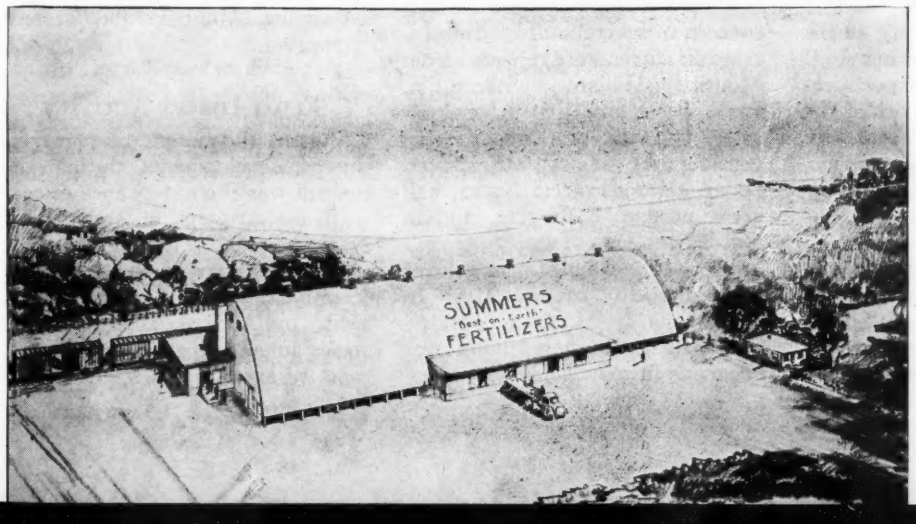
A St. Regis 327 valve packer is part of the installation and delivers bagged fertilizer to a conveyor leading to the shipping platform.

Stolt Named General Manager

W. A. Stolt, former Summers' manager at Grand Forks, N. D., has moved to Sioux Falls as general manager of both Dakota plants, according to Totman. Other staff members include A. J. Klaverkamp, assistant manager from the Baltimore home office, and Gordon Salmonson, field representative.

Wm. H. Rasmussen, Stolt's assistant for many years, has been named manager of the Grand Forks branch with Kenneth Stamus, agronomist, and Arne Askjem, general assistant.

In making the announcement, Totman explained that the decision to build the Sioux Falls plant was made after a thorough survey was made of the fertilizer needs of the area within 100 mile radius of that city. Included in region served are parts of South Dakota, Minnesota, Iowa and Nebraska. Totman pointed out that the new plant can also ship economically into a portion of the territory formerly served by the Grand Forks plant. ◆



Summers Fertilizer Co.'s new Sioux Falls, S. D. plant has a rated capacity of 40,000 tons.

Pest Reports

Boll Weevil Survival

Ground trash examination in Georgia this spring to determine the survival rate of the boll weevil showed that there was an average of 467 live weevils per acre compared with 1,984 found in hibernation last fall. The average of 467 per acre for this season is well below the 1,055 found surviving the winter of 1952–53. This survey was conducted in Gordon, Spalding and Burke counties.

In Florence county, S. C., a total of 1,936 live boll weevils were found per acre in the spring of 1954 compared with 5,932 in 1953 and a 17-year average of 2,929. The per cent survival was 55 compared with 95 in 1953. Only in three other years on record has survival been lower.

An average of 1,820 live weevils was found in five representative cotton counties in North Carolina. This figure compares with 3,920 per acre in 1953.

Examination in two counties in Virginia, Nansemond and Southampton, showed an average of 1,888 live weevils per acre. No spring examinations were made in this state in 1953; however, this year's average is over four times the average found in spring of 1952 in the same two counties.

As previously reported, the survival rate for Madison parish, La., this spring was 1,113 per acre or about one and one-half times the average found in this parish during the past 18 years.

Cereal and Forage Pest Activity in April

One of the most active of all the insects reported upon during April was the pea aphid. Reports received during the first part of the month recorded damage to newly-seeded alfalfa in the El Paso, Tex., area and the insects were in outbreak numbers in areas of New Mexico.

By the middle of April the aphid was reported active from Delaware to Arizona. In Kansas, pea aphids were found in all fields surveyed with very serious infestations in parts of Montgomery and Wilson counties. Increases were recorded in Oklahoma, Missouri, Illinois, Maryland and Delaware.

The meadow spittlebug was hatching by early April as far north as Illinois where nymphs were observed in Jasper, Champaign, White, Christian, Washington, Massac and Pulaski counties. In Delaware, by mid-April hatching was increasing and small spittle masses were appearing in alfalfa and clovers in the Smyrna-Leipsic area. Hatching in Maryland was observed on weeds, alfalfa and clover in Baltimore, Cecil, Somerset and Wicomico counties.

Based on material received from Economic Insect Survey Station, Plant Pest Control Branch, Agricultural Research Service, USDA, supplemented with information received by FARM CHEMICALS *from Federal and state agencies.*

The clover leaf weevil was another forage insect which was rather active during April. This insect caused damage to red clover in Delaware and Kansas. In Illinois, the weevils averaged 42 per square foot of clover in Champaign county, 14 in White, 55 in Christian, 26 in Jasper, 30 in Washington and 12 in Massac and Pulaski. Maryland reported one to four larvae per alfalfa plant while Missouri reported up to seven per crown in red clover but fungus disease was evident on about 90 per cent of the larvae.

Mites on legumes were causing concern in several states. Infestations on clover were reported from Monticello, Hilliard and Starke, Fla. In Webster and Red River parishes, La., the pest was causing considerable damage to clover. Damage was also occurring in small areas around Kirbyville, Lufkin and Bryan, Tex. Twenty per cent of the stand was killed in one clover field in Shelby county, Mo. In the Artesia, N. M., area, considerable damage to new alfalfa was occurring in some fields.

Armyworms were continuing to attract attention in several states. Heavy flights were continuing in Louisiana and Mississippi and had occurred in Missouri. Moths were taken in Kentucky on April 2 and as far north as Champaign, Ill., by April 6.

Truck Crop Insects

During early April important insect activity was underway on truck crops in several southern states. Mexican bean beetle adults and larvae were reported on beans in northern Florida and Charleston, S. C. Infestation of Colorado potato beetle was occurring on potatoes in these areas also, and on tomatoes in Tattnall county, Ga.

The heavy infestation of beet leafhopper on spinach in the Crystal City, Tex., area was continuing and resulting in severe loss to the crop from curly top virus.

Spider mites were well distributed on strawberries in Louisiana and eastern Virginia, and heavy enough in some fields in New Jersey to warrant use of miticides. Two important pests, hornworms and budworms, were appearing on tobacco in Florida.

Medium to heavy infestations of cutworms were reported on vegetables, especially tomatoes, in Harris, Polk, St. Augustine and Cass counties, Tex., while the corn earworm was heavy on lettuce in Zavala and Uvalde counties.

Potato psyllid populations in the breeding areas of the southwestern states were reported to be much higher during March, 1954, than at any time in the past 10 years. If weather conditions are favorable during May and June, a potential danger exists for a northward movement into potato and tomato growing areas of Utah, Colorado, Wyoming, Montana and western Nebraska.

Fruit Insect Activity

Among the more important fruit insect developments during the month was the appearance of several major pests in orchards in various states. Plum curculio had appeared as far north as Jackson county, Ill., and Wicomico county, Md., by April 8, and eggs were being found in peaches in Georgia and Arkansas.

Aphids were hatching in apple orchards in several New York counties early in the month as well as in fruit-growing states to the south. Catfacing insects such as stink bugs and plant bugs were out in peach orchards in Indiana, Illinois and Maryland.

White Fringe Beetle

A recent larval survey uncovered two specimens at Fort Gaines, Ga., the first found in Clay county for more than three years. Extensions of known infestations in several localities in infested states were also revealed.

Pink Bollworm Quarantine

Arkansas has been added to the list of states quarantined because of the pink bollworm. A recent USDA regulation affects the movement of lint, linters, cottonseed, cotton products and other articles from the lightly infested Arkansas counties of Columbia, Hempstead, Howard, Lafayette, Little River, Miller, Nevada and Sevier.

At the same time, Bexar county, Tex., has been designated a heavily, instead of a lightly, infested area and Bienville and Webster parishes, La., and all Oklahoma counties outside the former regulated areas were designated as lightly infested and subject to regulation.

European Corn Borer

Pupation reported well under way in Sussex county, Del. amounting to 15 per cent in some fields. In Kansas, an overwintering mortality of 23 per cent was found in corn stalks examined in seven northeast counties. Illinois reports indicate the pest survived winter in excellent condition, with 70–80 per cent of borers collected found alive and healthy.

Corn Borer in 1953

An estimated 90 million bushels of grain corn valued at more than $125 million was destroyed by the European corn borer in 1953 according to USDA data.

The loss is equivalent to three per cent of the past year's total grain corn production. Most of the loss occurred in three states: Illinois (25 million bushels), Iowa (33 million) and South Dakota (10 million).

Research Briefs

Plum Curculio Control

Experiments at Fort Valley, Ga., involving the use of insecticides as foliage sprays and as soil amendments are providing good leads for better control of the plum curculio on peach.

Early season foliage spray of dieldrin, followed by parathion, controls this insect better than parathion sprays alone, USDA entomologists have found. In a different approach to the problem, the researchers found that mixing aldrin or dieldrin into the soil destroys a high percentage of the pests.

Field-trial use of dieldrin sprays reduced infestation in peaches that dropped early in the season below that when such recommended insecticides as parathion and EPN were used. Infestations in harvested fruit treated with dieldrin followed by parathion, were as low or lower than those resulting from use of either parathion or EPN.

When entomologists sprayed with dieldrin at petal fall, at shuck off and two weeks after shuck off, followed by two later season parathion sprays, early fruit drop infestation was 4.1 per cent. There was no infestation at harvest time.

Dieldrin applied at petal fall and at shuck off, followed by three parathion sprays, resulted in only 0.9 per cent infestation of dropped peaches and 0.2 per cent infestation at harvest time.

In comparison, five parathion sprays during the season permitted 4.3 per cent infestation of dropped fruit and 1.1 per cent infestation of peaches at harvest. Five EPN sprays resulted in 4.6 per cent infestation of dropped peaches; 0.1 per cent infestation of harvested fruit.

Other insecticides that provided excellent plum curculio control when used as sprays in more limited, single-tree tests were aldrin, endrin and heptachlor.

Laboratory soil treatments with aldrin and dieldrin, applied in 1952, were still providing good control of the plum curculios that entered the soil more than a year after application to pupate. Two pounds per acre of aldrin prevented emergence of all but 0.2 per cent of the plum curculios. Used at four pounds per acre, aldrin allowed no emergence.

Dieldrin at two pounds per acre allowed 1.4 per cent of these larvae entering the soil to emerge as adults; at four pounds only 0.7 per cent emerged. Rate of plum curculio emergence from untreated soil was nearly 50 per cent.

CIPC for Dodder

Utah experiments during 1953 showed that Chloro-IPC offers promise for pre-emergence control of dodder in alfalfa seed fields. On plots treated with CIPC on April 1, no small-seeded dodder developed during the growing season even though the field was irrigated three times.

Three small patches of large-seeded dodder were found on the 19 treated plots; however, they developed so late in the season that no seed was formed. Seed yield averaged 347 pounds per acre as compared to 200 pounds on the untreated check.

Outstanding results were also recorded on plots treated May 6. In this series, a few patches of small-seeded dodder did develop and some dodder seed was formed. Yields averaged 365 on treated plots and only 153 on the untreated check.

Although both reduction of dodder and increased alfalfa seed yield were shown to be highly significant statistically, results from different rates of CIPC application were not significantly different. The three pound rate was as effective as the nine pound.

"CIPC Gives Promise of Controlling Dodder in Alfalfa," W. O. Lee and F. L. Timmons, Farm & Home Science, March, 1954, Utah State College, Logan, Utah.

Rose Dust Tests

Last year, 30 different dusts were tested at Beltsville in small field plots in an effort to develop a multi-purpose rose dust. Best growth resulted when a mixture of ferbam, sulfur, lindane, DDT and 88R was used.

None of the mixtures tested provided control of flower thrips, Jap

beetles or mildew; however, good control was established over black spot.

Sprays & Apple Flavor

Research work directed by Dr. Philip Garman, entomologist, Connecticut Agricultural Experiment Station, shows that there is a relationship between some chemical sprays and the amount of sugar and acid in an apple, factors which have a pronounced effect on flavor. Some increase the quantity of sugars and acids in fruit; others have have a depressant effect.

Twenty insecticides and fungicides, in various combinations, were used in the Connecticut experiments. It was found that, in general, sprays containing lead arsenate decreased both sugars and acids to some extent. Some fungicides, on the other hand, notably "Crag 341", increased the sugar content of the fruit. Fungicides also had an effect upon acid; some combinations reduced acids, while others such as captan or "Crag 341" (with lead arsenate) did not have this effect; in fact, a slight increase was noted for captan.

Sugar, acid and other components of the apples were determined by chemical analyses and, in addition, treated fruit was submitted to taste panels, which recorded flavor preferences. In general, people preferred apples which had not been sprayed with either lead arsenate or sulfur. In several cases, apples of the highest commercial grade ranked low in taste preference tests, indicating that large, attractive-appearing apples may not be the best-tasting.

The physical appearance of apples can also be affected by sprays, Dr. Garman and his associates found. For example, lead arsenate or sulfur may cause russetting, use of sulfur can also result in sun scald and bleaching, and any black-colored spray put on late in the season may reduce the color of the fruit.

From "Quality of Apples As Affected by Sprays," Bulletin No. 576, by Dr. Garman, L. G. Keirstead and W. T. Mathis, The Connecticut Agricultural Experiment Station.

How NOT to make a cake

Making a cake is an excellent practice in the kitchen but something to avoid in the fertilizer factory.

One of the causes of caking is the tendency of fertilizer salts to show reversible reactions in taking up and giving off moisture.

By proper formulation, fertilizer mixtures, with fairly stable properties under ordinary humidity conditions, may be produced from salts individually inclined to "change with the weather."

How to avoid caking has been a subject of Nitrogen Division technical research for many years. Perhaps one of our technical service men can help you with your formulation problems. His services are available to our customers without charge.

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1953 State Fertilizer Reports

Maryland

L. E. Bopst, Maryland state chemist, reports that 128 firms registered 858 brands during 1953. A total of 73 complete fertilizer grades was registered along with 11 superphosphate-potash mixtures.

Reported sales for the year were set at 296,661.21 tons with complete goods comprising 258,474.17 tons of the total. The four top analyses, according to tonnage sold, were 3–12–6, 5–10–10, 5–10–5 and 4–8–12.

This tonnage set a new record, with an increase of 5,434 tons over 1952. Bopst points out that the increase was especially noticeable in the 5–10–10 grade with a gain of over 23,000 tons. He adds that anhydrous ammonia and nitrogen solutions made their first appearance in the heavy tonnage class.

Missouri

Consumption of fertilizers in Missouri during 1953 totaled763,-276 tons, of which 458,042 tons were in mixed goods. Top grades included 8–24–8, 3–12–12, 8–8–8, 4–12–4 and 12–12–12.

A recent tabulation by the Missouri Agricultural Experiment Station also shows that over 13,000 tons of anhydrous ammonia were sold along with nearly 2,500 tons of nitrogen solutions.

New Mexico

Shipments of fertilizer into New Mexico during 1953 totaled 24,-829.38 tons, according to the state feed and fertilizer control office.

Principal mixed fertilizers sold during the period included in order: 16–20–0, 13–39–0, 14–14–0, 6–2–0 and 10–20–0. Anhydrous ammonia shipments totaled 1,482.13 tons. The principal material used in New Mexico was 45 per cent superphosphate which accounted for nearly 23.9 tons of the total shipments.

Texas

Sales of fertilizer in Texas during the last half of 1953 dropped sharply, according to J. F. Fudge, state chemist. The decrease is about 17,000 tons under the same 1952 period and 75,000 tons below 1950. Fudge states that most of the decreases can be attributed to a drop in sales of normal superphosphates.

Sales of mixed goods decreased only slightly over the last four years and accounted for about one third of the total tonnage in 1953. Fudge reports large relative increases in sales of 1–4–4 (3–12–12), 1–1–0 (10–10–0) and 1–1–1 (8–8–8) ratios while decreases occurred in sales of 0–1–1 (0–12–12) and 0–2–1 (0–14–7) ratios.

Sales of nitrogen materials continued to increase, a trend particularly noticeable with ammonium nitrate and ammonium sulfate. According to Fudge, significant quantities of anhydrous ammonia have been sold during the last three years.

West Virginia

Fertilizer sales in West Virginia during 1953 dropped well below the 84,168 tons sold in 1952, according to J. N. McLaughlin, state commissioner of agriculture. Compared to the previous year, sales were down 12 per cent in the first six months of 1953 and 16 per cent during the last half, averaging a 13 per cent decline.

Total purchases were set at 84,-168 tons, of which 68,420 tons were mixed fertilizers. Based on average prices paid during the year, McLaughlin estimated that sales totaled about $4.2 million.

McLaughlin added that a decline of 8,825 tons in superphosphate sales was primarily responsible for the over-all decrease. Mixed fertilizer sales were down 3,845 tons from 1952 while unmixed nitrogen sales were slightly higher.

1952 Okla. Pesticide Use

A report forwarded by C. F. Stiles, Oklahoma extension entomologist, shows that an estimated 282,818 acres of crops received pesticide protection during 1952. A total of 1,187,656 acres were planted, of which 15,825 were abandoned.

Other figures in the report, all estimates, reveal that 186,672 acres were sprayed and 150,967 were dusted at a total cost of some $812,828.50. Farmers participating in control programs totaled 11,155.

The average number of pesticide applications ranged from 0 to 12 in various counties. Average dusting rates per acre went as high as 15 pounds in some areas and spray rates went up to 1,200 gallons per acre.

Pesticide materials and estimated quantities used in Oklahoma during 1952 are shown in the following table:

Pesticide	Quantity
3-5-40	1,846,300 lbs. dust
3-10-40	1,429,600 lbs. dust
Toxaphene 20-40	89,780 lbs.
Tox. & DDT	69,729½ gal.
Tox. Emuls.	21,062½ gal.
DDT 25% Emuls.	25,638 gal.
Aldrin alone	2,922
Aldrin & DDT	7,700
Chlordane	417
Cal. Arsenate	18,750
Parathion	300
Others	5,364

CALENDAR

May 17-20—Basic Materials Exposition, Chicago.
May 23-25—CSMA mid-year meeting, Cincinnati, O.
June 3-5—Mfg. Chemists Assn. meeting and outing with SOCMA, The Greenbrier, White Sulphur Springs, W. Va.
June 10-13—APFC annual meeting, The Homestead, Hot Springs, Va.
June 13—Exec. committee meeting of Fert. sec., Nat. Safety Council, The Greenbrier, White Sulphur Springs, W. Va.
June 14-16—NFA meeting, Greenbrier, White Sulphur Springs, W. Va.
June 14-16—Corn Belt branch, American Soc. of Agronomy meeting, Lincoln, Neb.
June 21-22—Assn. of Southern Feed and Fert. Cont. Officials meeting, Skirvin Hotel, Oklahoma City, Okla.
June 22-24—Pacific Slope Branch, ESA meeting, Pilot Butte Inn, Bend, Ore.
June 28-29—N. Central Phytopathological meeting, Ames, Iowa.
July 1-5—9th annual conv., Plant Food Producers of Canada, Manoir Richelieu, Murray Bay, P.Q.
July 12-14—Summer meeting, Northeast branch, Amer. Soc. of Agronomy, New Brunswick, N. J.
July 20-22—Pacific N.W. Plant Food Assn. fert. conf., Klamath Falls, Ore.
July 22-23—Southwest Fert. conf., Buccaneer Hotel, Galveston, Tex.
July 28-30—Beltwide Cotton Mechanization conf., Little Rock, Ark.
Aug. 11—Annual Kentucky Fert. conf., Guignol Theater, U. of Ky., Lexington.

Ark. Insecticide Usage

Insecticide usage in Arkansas during 1953 was somewhat below normal with 27,509,734 pounds of dust or dust equivalent used, according to a report by Gordon Barnes.

Potash Deliveries in 1953 Reach New High

The American Potash Institute reports that potash deliveries in North America during 1953 totaled 3,230,667 tons of salts containing an equivalent of 1,879,626 tons K_2O. This was an increase of 83,368 tons K_2O (five per cent) over 1952.

Deliveries of 1,722,728 tons K_2O by the seven major domestic producers were the highest ever achieved. Imports of 156,898 tons K_2O were 26 per cent below last year.

Agricultural potash accounted for 98 per cent of deliveries. Deliveries for agricultural purposes in the U. S. totaled 1,663,242 tons K_2O, an increase of 70,662 tons over 1952. Illinois was the leading state with over 204,000 tons K_2O delivered. It was followed in order by Ohio, Georgia and Indiana.

The most popular agricultural material continued to be 60 per cent muriate which accounted for 90 per cent of the total deliveries.

January Super Report

As shown in the monthly FARM CHEMICALS production table, superphosphate production during January was seven per cent over December and four per cent greater than in the corresponding month of 1953.

Shipments of all grades totaled 104,760 tons for the month, an increase of nine per cent over December volume. Stocks on hand at the end of the month were seven per cent more than those held on Jan. 1.

Preliminary totals announced by the Bureau of the Census for July, 1953 through January, 1954 show that production and shipments of normal and enriched superphosphate declined 10 and 13 per cent respectively when compared with the same 1953 period. At the same time, both production and shipments of concentrated material increased 17 and seven per cent, respectively. Figures for wet base goods showed declines of nine and 26 per cent.

1953 Sulfur Output Below 1952 Record

Sulfur output during 1953 totaled 5,155,342 tons of native sulfur according to a recent Bureau of Mines report. Although the total was three per cent below the 1952 record, the 337,000 tons of recovered sulfur produced represented a 36 per cent gain over the previous year.

Sales were about equal to production and as a result producers' stocks at the end of 1953 were only slightly lower than at the beginning of the year.

Totals for the year in long tons of native and recovered (purity of 97 per cent or greater) sulfur include:

Native Sulfur (Frasch)

Production	5,155,342
Mine or plant shipments	5,224,234
Apparent sales	5,201,711
Producers' stocks	3,022,486

Recovered Sulfur

Production	337,099
Mine or plant shipments	321,062
Apparent sales	324,417
Producers' stocks	107,344

Production — January, 1954

Compiled from government sources

Chemical	Unit	January 1954	January 1953	December 1953
Ammonia, synth. anhydrous	s. tons	206,679	188,882	199,907
Ammonia liquor (NH_3 content–coal & coke)	pounds	4,140,199	4,187,308	4,207,798
Ammonium nitrate, fert. grade (100% NH_4NO_3)	s. tons	134,726	120,799	140,144
Ammonium sulfate				
synthetic (technical)	s. tons	58,799	84,944	35,044
coke oven by-product	pounds	150,298,285	162,857,005	152,930,755
BHC (Hexachlorocyclohexane)	pounds	*4,748,298	——	3,588,150
Gamma content	pounds	*628,788	——	479,033
Calcium arsenate (commercial)	pounds	——	419	——
Copper sulfate (gross)	s. tons	5,108	——	5,904
DDT	pounds	7,769,963	——	7,056,304
2,4-D Acid	pounds	1,797,614	——	——
esters & salts	pounds	*1,094,794	——	1,211,311
esters & salts (acid equiv.)	pounds	*854,071	——	894,563
Lead Arsenate (acid & basic)	s. tons	1,026	709	278
Phosphoric acid (50% H_3PO_4)	s. tons	233,063	*207,747	196,946
Sulfur, Native (Frasch)	l. tons	468,559	418,568	437,499
Recovered	l. tons	28,000	28,239	28,000
Sulfuric Acid, gross (100% H_2SO_4)	s. tons	1,180,914	1,184,405	1,166,896
Chamber process (100% H_2SO_4)	s. tons	223,163	251,038	243,344
Contact process (100% H_2SO_4)	s. tons	957,751	933,367	923,552
Superphosphate (100% APA)	s. tons	181,074	174,796	*168,768
Normal & Enriched (100% APA)	s. tons	133,325	136,488	*133,375
Concentrated (100% APA)	s. tons	46,964	37,231	34,549
Wet base (100% APA)	s. tons	785	1,077	844
2,4,5-T Acid	pounds	192,093	——	——

* Revised

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FERTILIZER MATERIALS MARKET

New York

April 12, 1954

Sulfate of Ammonia. While the movement was reported better at most producing points, shipments at other points were said to be disappointing and below this time last year. No price changes were noted and producers are shipping against current orders.

Nitrate of Soda. This material is expected to move better in the next 30 days but stocks available are said to be ample to take care of any demand that may develop.

Ammonium Nitrate. Producers have been experiencing an excellent demand all season and are sold ahead.

Urea. Demand for imported material was fair with light stocks available at most ports and prices quoted at around $120 per ton at ports.

Nitrogenous Tankage. Current quotations are $3.65 to $4.40 per unit of ammonia ($4.43 to $5.35 per unit N) f.o.b. various shipping points with some producers sold ahead for 30 to 60 days and demand good for quick shipment.

Castor Pomace. The price of this material was recently raised to $27 per ton, f.o.b. production points, and offerings are limited. Production was seriously affected by recent maritime strike.

Organics. Organic fertilizer materials were very firm in price and offerings limited for immediate shipment. Soybean meal for prompt shipment was quoted at $88 per ton, f.o.b. Decatur, Ill., in bulk, and linseed meal was difficult to obtain, with last sales at $75 per ton in bulk, f.o.b. Western producing points. Cottonseed meal was picked up as available by both the feed and fertilizer trade. Blood sold at $8.25 per unit of ammonia ($10.02 per unit N), f.o.b. New York, with tankage offered at the same price and last sales made at $7.75 ($7.42 per unit N), f.o.b. New York.

Fish Meal. Offerings were scarce of menhaden fish meal as the feed trade actively sought to buy for quick shipment. Last sales on basis of $145 per ton, f.o.b. Eastern points.

Bone Meal. This material was difficult to locate for immediate shipment with some producers sold out for the next 60 days and last sales made on the basis of $60 per ton, although some higher prices were heard. The feed trade has purchased large quantities recently.

Hoof Meal. Recent advances in price have pushed the price up to $7.50 per unit of ammonia ($9.12 per unit N), f.o.b. Chicago, with offerings difficult to locate.

Superphosphate. Several new plants which will supply triple superphosphate have run into some mechanical difficulties, with the result they have not been able to obtain full production. Triple super for quick shipment is hard to obtain. Normal or regular superphosphate seems to be in adequate supply with no price changes noted.

Potash. Some producers feel that the peak of the shipping season has passed but shipments are keeping up fairly well and no shortage is reported. However, sulfate of potash is said to be in short supply with some recent arrivals of imported material reported to help out buyers who were unable to secure enough domestic material.

Philadelphia

April 12, 1954

Movement of mixed goods has eased up somewhat, and in terms of actual plant food, the tonnage is expected to compare favorably with last season. Raw materials as a whole are in somewhat greater demand than supply. Liquid nitrates and ammonium nitrate are reported rather tight. Sulfate of ammonia stocks have been greatly reduced. Bone meal is rather scarce and triple superphosphate is definitely short. Tankage is scarce and higher in price. Potash is reported moving at a fairly satisfactory rate.

Nitrate of Ammonia. Practically entire production is said to be contracted for several months ahead, and demand continues ahead of supply.

Sulfate of Ammonia. Market is firm with inventories well leveled off and a slight tendency now toward tightness in the supply position. There is a fair supply of imported material.

Nitrate of Soda. Demand is good and the supply ample to meet all requirements. No price changes reported.

Blood, Tankage, Bone. Blood remains fairly steady at $8.25 per unit ammonia ($10.02 per unit N) in the East, and $8.50 ($10.33 per unit N), Chicago. Tankage, however, is much stronger at $7.75 ($9.42 per unit N) in the East and $8.50 ($10.33 per unit N), Chicago. Bone meal is in limited supply and quoted at $60 per ton. Hoof meal is quiet, but firm, at $6.75 ($8.20 per unit N), Chicago area.

Castor Pomace. The supply is presently very short and nothing is being offered.

Fish Scrap. This continues very scarce with menhaden meal quoted at $145 per ton, and scrap at $140, Baltimore basis.

Phosphate Rock. Supply remains adequate and demand is satisfactorily normal with slight delivery delays reported at some plants.

Superphosphate. Triple grade is in exceedingly tight supply and demand is strong. Supplies of normal are fully adequate but movement is said to be rather disappointing.

Potash. Movement against contracts has been very good and is expected to continue to the end of the season.

Hon. J. Earl Coke, assistant secretary of USDA; Louis A. Rozzoni, vice pres., Calif. Farm Bureau Federation, and Jesse W. Tapp, pres., San Francisco Chamber of Commerce.

San Francisco C of C Ag-Business Meet

About 250 northern California farm and business leaders met in San Francisco on March 31 for the seventh annual Agriculture-Business Conference sponsored by the Agricultural committee of the San Francisco Chamber of Commerce.

Heading the list of speakers who spoke on the present agricultural and business outlook was the Hon. J. Earl Coke, assistant secretary of USDA. In 1953, he was granted a leave of absence from the University of California where he was director of the Extension Service to accept his USDA post.

Coke's Comments

The time has come, Coke declared, for an agricultural program which will allow 1. the law of supply and demand to regulate production, 2. such acreage adjustments as are needed to help bring production back into balance and 3. a vigorous program to expand markets.

E. D. O'Brien, vice president, American Trust Co., forecast that it may take several years to "bring the cost and price ratio into balance, and during this time the inefficient farmers, or those on marginal land, are going to be in a squeeze."

Sound Money & Credit

Money and credit "look strong and sound today—a very encouraging omen," stated T. S. Petersen, president of Standard Oil Co. of California. He predicted that there would be no serious recession, although he said we are now in a mild decline.

Also scheduled to speak at the conference were J. W. Maillard, III, chairman of the Agricultural committee of the San Francisco C of C; R. F. Mulvany, Irving Lundborg Co., and W. B. Camp, W. B. Camp & Sons and director, Chamber of Commerce of the United States representing Agriculture.

Jesse W. Tapp, president of the city's C of C and a member of President Eisenhower's Commission on Foreign Economic Policy, presided at the luncheon session. ◆

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editorial

The Entomology Centennial

Few people in your public know what would happen if man's ceaseless war on insects was relaxed for even a month."

In this way David G. Hall, information head, USDA Agricultural Research Service, began a letter which accompanied the excellently prepared "Insect Facts" kit which was recently issued to assist in commemoration of the centennial of professional entomology. The kit has been sent to magazines, newspapers, experiment stations, radio farm directors and to the manufacturers who assisted in financing the project.

Dr. Hall has done a wonderful job of assembling information which will give the layman a better idea of the importance of entomology in the development of our country and the health of our people. He points out that this 100th anniversary is a "real opportunity to help tell a dramatic story, and to alert the American people to the need for a ceaseless watch on the insect world and a continuous search for newer and better control methods."

The profession of entomology has made tremendous gains since 1854 when Dr. Asa Fitch was named entomologist in New York state and when Towend Glover was appointed the first Federal entomologist.

The research activities of this group have provided the base on which the pesticide industry is built and through entomologists' efforts, pesticide manufacturers are able to provide the proper materials to control most of the more than 6,500 destructive insects known to exist in the United States.

Without this control, half of our annual agricultural production would be destroyed and thousands would die from insect-borne diseases. It has been estimated that since 1942, the development and use of DDT to control such disease-carrying pests as mosquitoes, lice, flies and fleas has saved an estimated five million lives and prevented 100 million illnesses.

Dr. H. H. Ross, president of the Entomological Society of America, points out that "unlike most other troubles of man, bugs affect each and every one of us. They work on our agricultural crops, both food and fiber; they invade our homes to feed on our woolens and our food; they despoil our forests and our outdoor recreation areas and they transmit some of the most dread sicknesses of mankind."

That the farmer is becoming increasingly aware of the importance of insect control was demonstrated in a recent survey which indicated 36.6 per cent of the inquiries received by county agents during the growing season concern insects. These queries average about 17 per cent throughout the year.

To help emphasize the importance of entomology during the June anniversary, the plans originally announced by the Centennial committee, which Dr. Hall heads, call for "Open House" by Federal, state and industrial laboratories so that the general public can be told what entomology has done and is doing for the country.

The group also hopes to obtain industry cooperation in the form of commercial dedications and June advertising space in addition to newspaper, magazine, radio and TV coverage.

Members of the industry might well decide to tie in some additional promotional activities, using this opportunity to tell the public of the part they play in the control of insects and other pests. The slogan adopted by entomologists for 1954, "Fight Your Insect Enemies," provides an excellent setting for such a public relations job.

Those with laboratory facilities could consider opening them to the public for a short period, providing small displays of interest to the general public. An even better step, if it can be arranged, would be to open a portion of the manufacturing facilities for inspection.

Both steps can help to provide a much closer relationship between the manufacturer or formulator and the customer through a stimulation of interest in the company, its facilities and products.

Where it is possible to spend some additional time and effort on promotion work, the cooperation of newspapers and local radio-TV stations could probably be enlisted to provide feature stories and shorts on insect control. What better time could be picked for material showing the growth of your company and describing its activities, facilities and products?

If possible, consider the use of some good-will advertising space, direct mail pieces, carrier advertising, field demonstrations and other methods.

For ideas, information and assistance, the services of USDA, extension, experiment station, state and college personnel are available. Authoritative material should be obtainable from one or more of these sources in every state. If you don't know whom to contact, drop a line to FARM CHEMICALS. We have a list of suggested contacts for each state and will gladly supply names and addresses for those in your area.

We take pleasure in saluting the 4,500 professional entomologists who will next month celebrate the centennial of their profession. We hope that you in some way, however small, will contribute to this occasion. You will be serving not only the public and your own company, but the industry as well.

—GEO. P. TEEL, JR.
Managing Editor

FREE INFORMATION to help you solve fertilizer, pesticide problems

Reader Service

131—Cut Wasted Manhours

The A. J. Sackett Co. suggests that you retire obsolete, profit-absorbing batching methods and consider the popular Sackett one man batch weigh system for high operating efficiency. The company says this is one of the most efficient pieces of production equipment ever offered the industry. For a copy of the four page folder describing the system

CIRCLE 131 ON SERVICE CARD

132—Lab Price List

The Raymond C. Crippen Research & Development Labs has a new price list bulletin on the services it offers. Included are analyses of insecticides, herbicides, fungicides, rodenticides and fertilizer materials. The list also shows prices of special services such as preliminary screening of pesticides, dust and spray evaluation, residue tests and soil analysis.

CIRCLE 132 ON SERVICE CARD

133—Air-Floated Kaolin

Tako kaolinite kaolin from the Thomas Alabama Kaolin Co. is high in Al_2O_3, very low in iron and contains no mica. The air-floated material, for fertilizers and insecticides, is available in bags or bulk. For samples and prices of this high grade material

CIRCLE 133 ON SERVICE CARD

134—Urea Production

By using the Montecatini Urea Process, available solely through the M. W. Kellogg Co., you can make high quality material with lower initial development and decreased operating costs. A brochure describes major advantages of the process which also offers high yields on feed stock, resin grade urea and 90 per cent on-stream efficiency. An additional processing step is now being developed to provide practically 100 per cent conversion.

CIRCLE 134 ON SERVICE CARD

135—Koppers Bulletins

Koppers Co. offers an informative packet of six bulletins on its Bitumastic protective coatings. Included in the group are: Hi-Heat gray for high-temp corrosion prevention; Black Solution for general low-cost maintenance; Super-Service Black, a heavy duty coating for more severe conditions; No. 50 extra heavy duty coating for very severe corrosive conditions; No. 28, heavy duty coating for atmospheric corrosion control, and Tank Solution, a quick drying material useful for water tanks, etc. To obtain a set of these bulletins

CIRCLE 135 ON SERVICE CARD

136—New Sturtevant Separator

The new Sturtevant Mill Co. Whirlwind Air Separator has been especially designed to pick off classified materials. Used in a closed circuit with grinding mills, it increases production and cuts power costs. Features include a large feed opening, rugged construction, ease of adjustment and low power consumption. For further information

CIRCLE 136 ON SERVICE CARD

137—NH_3 Valves & Fittings

Henry Valve Co. offers a new catalog covering its anhydrous ammonia valves and steel fittings. Included are illustrations and specifications on all types of valves and a variety of drop forged or cold rolled steel fittings. The Henry products have many outstanding patented construction features. To obtain a copy

CIRCLE 137 ON SERVICE CARD

138—Acme Protection Guide

A guide to protection from hazardous gases, mists and fumes is available from Acme Protection Equipment Co. It provides descriptive information, limits for determining safe working conditions and listings of the type of Acme canister for each specific hazard. The 433 materials covered include ammonia, BHC, parathion, sulfuric acid, TEPP and a number of other agricultural products.

CIRCLE 138 ON SERVICE CARD

How to use the READER SERVICE CARD

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139—Ortho Livestock Guide

A unique Ortho Livestock Pocket Guide and Gestation Chart has been developed by California Spray-Chem. Corp. A complete insecticide schedule for all insects attacking beef and dairy cattle, sheep, poultry, etc. shows the material to use, method of application and required dosage. For a copy

CIRCLE 139 ON SERVICE CARD

140—Ser-X Diluent

Ser-X, the new insecticide diluent from Summit Mining Corp., has excellent drift control properties, better floability, neutral *p*H, desirable suspension properties and controlled bag weights. For complete information and samples

CIRCLE 140 ON SERVICE CARD

141—Michigan Air Controls

Clark Equipment Co. has a 12 page illustrated brochure explaining the theory and practical application of air controlled clutches which are standard equipment on all Michigan excavator-cranes. Graphed and tabular material is presented which gives comparative figures and actual time tests between machines equipped with air controls and mechanical controls.

CIRCLE 141 ON SERVICE CARD

142—Multiwall Tips

An illustrated booklet on safe storage tips for multiwall paper bags is available from Fulton Bag & Cotton Mills. It outlines a series of helpful tips which will save time and unnecessary expense. Also included are ideas on how to improve multiwall storage and the rights and wrongs of bag handling.

CIRCLE 142 ON SERVICE CARD

143—Special Tech. DDT

You can save time with Pentech special technical DDT from Pennsalt. A patented process reduces the wax-like nature of DDT, making the particles more friable. It is supplied as a fine granular material for blending into dust bases. Advantages include lower costs and maximum production through faster grinding and blending, less chance of clogging and greatly reduced dry ice requirements. For detailed production information

CIRCLE 143 ON SERVICE CARD

144—Cyanamid & Soil Humus

Building soil humus with Aero Cyanamid is discussed in a small American Cyanamid folder. Tables show the recommended rates of cyanamid per acre for building humus according to the crops to be grown and the material to be plowed down.

CIRCLE 144 ON SERVICE CARD

145—Seminole Carrier

Southern Clays produces Seminole pretreated aluminum silicate insecticide carrier, a material with uniform particle size and *p*H. Another feature of the water washed product is that it has a very low viscosity in water at 60 per cent solids without the addition of wetting agents. For further information

CIRCLE 145 ON SERVICE CARD

146—Wisc. Alumni Booklet

A 32 page illustrated booklet from Wisconsin Alumni Research Foundation describes the operation and work of this organization including its activities in pesticide testing. Lab facilities are offered to the industry on a fee basis and, with the completion of a new laboratory, the foundation can offer occasional or periodic testing of raw materials or finished products. For a copy

CIRCLE 146 ON SERVICE CARD

147—Boost Mixed Goods Production

Use of a Worthington Corp. fertilizer mixer can boost daily output by as much as 10 per cent. An engineered blade design gives a fast mixing cycle and the mixer can be set up for continuous agitation. These units also eliminate the problems of corroded discharge chutes, dust spreading and heavy power consumption. For more information

CIRCLE 147 ON SERVICE CARD

148—New Eston Spray

Eston Chemical division has a leaflet outlining the characteristics of its new Tetron-50 insecticide spray. The nonresidual material can be used safely to within 24 hours of harvest, controls many types of soft bodied sucking insects and may be safely applied to a wide variety of crops.

CIRCLE 148 ON SERVICE CARD

149—Piper Ag Plane

The Piper PA-18A Agricultural Super Cub is especially designed for agricultural flying and carries, according to the company, the same load as efficiently as planes of more than twice the power. It features large capacity tanks (100 gal. liquid or 18 cu. ft. dust), floating booms and slotted venturi. This is the first applicator plane to be built in quantity with factory-designed and installed dispersal equipment as an integral part of the plane. For complete data

CIRCLE 149 ON SERVICE CARD

150—Merculine Available

Merculine, the organic mercurial liquid emulsion fungicide from H. L. Woudhuysen, has been shown highly effective for cereal and some vegetable seeds and as a general agricultural product. It can be used at reduced concentrations, is easy to handle, mix, apply and store and there is no risk of dusts or fumes. If you are interested in including Merculine in your distribution plans

CIRCLE 150 ON SERVICE CARD

151—S/A Hold-back Unit

A bulletin from Stephens-Adamson describes the company's enclosed roller type hold-back which is designed to prevent reversal of bucket elevators and included conveyors due to power failure under load. It mounts directly on the drive shaft and releases instantly when the forward motion of the shaft is resumed.

CIRCLE 151 ON SERVICE CARD

152—Lower Emulsifier Inventories

Only two emulsifiers are needed to emulsify 22 toxicants, according to Rohm & Haas. By using Triton X-150 and X-160 you can have the advantage of operating with minimum emulsifier inventory and, in addition, the low levels of Triton required provide extra savings. Top performance is obtained in hard or soft water. For complete technical information

CIRCLE 152 ON SERVICE CARD

153—Sell Low-Vol Brush Killers

For increased sales of brush killers, consider the use of Pittsburgh Coke & Chem. low-vol materials. You are backed with a complete advertising program and aggressive promotion. As a basic producer, Pittsburgh offers fast deliveries and its brush killers have been field tested right in your area. Isoctyl esters provide maximum protection against vapor hazards. For the complete story

CIRCLE 153 ON SERVICE CARD

How to use the READER SERVICE CARD

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- **Print or type your name, position, company and address.**
- **Clip and mail the Service Card.**

154—'41' Clay for Concentrates

Type 41 clay from Southeastern Clay Co. can be combined with more costly diluents such as Fuller's earth to produce free-flowing concentrates of many organic insecticides including BHC, chlordane and toxaphene. The material is non-abrasive, has high insecticidal value, low pH, no phytotoxicity, fine particle size, absorptiveness, proper bulk and the ability to stick to the leaf. For further information

CIRCLE 154 ON SERVICE CARD

155—For Super Producers

Use of Sterox Aj in superphosphate production, according to Monsanto Chem. Co., promotes speedy and thorough penetration, spreading and dispersion of reactant components. The ionic surfactant helps produce a better conditioned product while increasing production rate. A technical bulletin describes actual results, effects in acidulation, use, data and functional properties.

CIRCLE 155 ON SERVICE CARD

156—Vibrating Conveyor

A new bulletin from Gifford-Wood Co. illustrates and describes the "Oscilveyor" vibrating conveyor. Included are dimensioned engineering drawings and tabular data correlating pan size with speed of material travel. The units are particularly desirable for handling fine granular materials.

CIRCLE 156 ON SERVICE CARD

157—Fence Post Treatment

The double diffusion method of treating fence posts is described in a recent Phelps Dodge Refining Corp. booklet. The method involves use of copper sulfate and sodium chromate and is especially valuable where commercially-treated posts are not readily available. Very little equipment is needed and the method is said to be relatively inexpensive.

CIRCLE 157 ON SERVICE CARD

158—Fermate Folder

A new DuPont folder reviews 12 years' experience in the use of Fermate on apples. Quotes from growers and experiment station records describe results obtained in better fruit, healthier trees and higher profits.

CIRCLE 158 ON SERVICE CARD

159—New Regulating Device

Fischer & Porter has a four page catalog on a new, self-contained regulating device for clean, gas free liquids. Constant flow rate is maintained by means of energy derived from the flow stream itself, without power supply. The unit may be equipped with a diaphragm motor valve for remote setting of control point.

CIRCLE 159 ON SERVICE CARD

160—Dust Recovery

A 28 page catalog from the Buell Engineering Co. provides an excellent review of industrial dust recovery and a description of the various Buell collectors. The company offers a complete line of both mechanical collectors and electric precipitators.

CIRCLE 160 ON SERVICE CARD

161—Omega Belt Feeder

The gravimetric model 50-8 belt feeder produced by Omega Machine Co. completely weighs and feeds any dry, flowable material at a fixed rate. A bulletin describes the use and applications of this completely automatic feeder.

CIRCLE 161 ON SERVICE CARD

162—Dieldrin for Ants

Shell Chemical offers a small booklet on killing ants with Dieldrin which is designed for use as a direct mail piece to customers and for hand-out purposes. It includes specific information on the imported fire, red harvester and Argentine ant. Shell points out that Dieldrin kills ants quickly and economically without harm to lawn or plants. To obtain a copy

CIRCLE 162 ON SERVICE CARD

Buyers' Guide

Classified Index to Advertisers in 'Farm Chemicals'

ALDRIN

Ashcraft-Wilkinson Co., Atlanta, Ga.
Pittsburgh Coke & Chem. Co., Agr. Chem. Div., Pittsburgh, Pa.
Shell Chemical Co., Agr. Chem. Div., Denver, Colo.

AMMONIA—Anhydrous and Liquor

Commercial Solvents Corporation, New York City
Lion Oil Co., El Dorado, Ark.
Nitrogen Div., Allied Chemical & Dye Corp., N.Y.C.
Phillips Chemical Co., Bartlesville, Okla.
Spencer Chemical Co., Kansas City, Mo.

AMMONIUM NITRATE

Ashcraft-Wilkinson Co., Atlanta, Ga.
Commercial Solvents Corporation, New York City
Lion Oil Co., El Dorado, Ark.
Phillips Chemical Co., Bartlesville, Okla.
Spencer Chemical Co., Kansas City, Mo.

AMMONIUM PHOSPHATE

Monsanto Chem. Co., St. Louis, Mo.

AMMONIUM SULFATE

See Sulfate of Ammonia

AMMONIUM SULFATE NITRATE

Baker & Bro., H. J., New York City

BAGS—Multiwall-Paper

International Paper Co., Bagpak Div., N. Y. C.
Hammond Bag & Paper Co., Wellsburg, W. Va.
Hudson Pulp & Paper Corp., N. Y. C.
Kraft Bag Corporation, New York City
Union Bag & Paper Corp., New York City

BAGS—Dealers and Brokers

Ashcraft-Wilkinson Co., Atlanta, Ga.

BAG CLOSING MACHINES

Fischbein Co., Dave, Minneapolis, Minn.
International Paper Co., Bagpak Div., N. Y. C.

BAG PRINTING MACHINES

Schmutz Mfg., Louisville, Ky.

BAG FILLING MACHINES

Atlanta Utility Works, The, East Point, Ga.
Stedman Foundry and Machine Co., Aurora, Ind.

BHC AND LINDANE

Ashcraft-Wilkinson Co., Atlanta, Ga..
Diamond Alkali Co., Newark, N. J.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.
Pittsburgh Coke & Chem. Co., Agr. Chem. Div., Pittsburgh, Pa.

BONE PRODUCTS

American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
Bradley & Baker, N. Y. C.
Jackle, Frank R., New York City
Woodward & Dickerson, Inc., Philadelphia, Pa.

BORAX AND BORIC ACID

Woodward & Dickerson, Inc., Philadelphia, Pa.

BROKERS

Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
Bradley & Baker, N. Y. C.
Jackle, Frank R., New York City
Keim, Samuel D., Philadelphia, Pa.
Woodward & Dickerson, Inc., Philadelphia, Pa.

BUCKETS—Hoist, Crane, etc.

Hayward Company, The, New York City

CALCIUM ARSENATE

American Agricultural Chemical Co., N. Y. C.

CARS AND CART

Atlanta Utility Works, The, East Point, Ga.
Stedman Foundry and Machine Co., Aurora, Ind.

CASTOR POMACE

Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City

CHEMISTS AND ASSAYERS

Shuey & Co., Inc., Savannah, Ga.
Wiley & Company, Baltimore, Md.

CHLORDANE

Ashcraft-Wilkinson Co., Atlanta, Ga.
Pittsburgh Coke & Chem. Co., Agr. Chem. Div., Pittsburgh, Pa.

CLAY

Ashcraft-Wilkinson Co., Atlanta, Ga.

CONDITIONERS

Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
Jackle, Frank R., New York City
Keim, Samuel D., Philadelphia, Pa.
National Lime & Stone Co., Findlay, Ohio

CONVEYORS—Belt

Link-Belt Co., Chicago, Ill.

COPPER SULFATE

Tennessee Corp., Atlanta, Ga.

COTTONSEED PRODUCTS

Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N. Y. C.
Jackle, Frank R., New York City
Woodward & Dickerson, Inc., Philadelphia, Pa

DDT

Ashcraft-Wilkinson Co., Atlanta, Ga.
Diamond Alkali Co., Newark, N. J.
Monsanto Chemical Co., St. Louis, Mo.
Pittsburgh Coke & Chem. Co., Agr. Chem. Div., Pittsburgh, Pa.

DIELDRIN

Ashcraft-Wilkinson Co., Atlanta, Ga.
Pittsburgh Coke & Chem. Co., Agr. Chem. Div., Pittsburgh, Pa.
Shell Chem. Corp., Agr. Chem. Div., Denver, Colo.

DILUENTS

Ashcraft-Wilkinson Co., Atlanta, Ga.
Pioneer Pyrophyllite Producers, Beverly Hills, Calif.
Pittsburgh Coke & Chem. Co., Agr. Chem. Div., Pittsburgh, Pa.
Summit Mining Corporation, Carlisle, Pa.
Thomas Alabama Kaolin Co., Baltimore, Md.

DITHIOCARBAMATES

Berkshire Chemicals, New York City

ELEVATORS—Bucket

Link-Belt Co., Chicago, Ill.
Stedman Foundry and Machine Co., Aurora, Ind.

ENGINEERS—Chemical and Industrial

Chemical Construction Corp., New York City
Fairlie, Inc., Andrew M., New York City
General Industrial Development Corp., N. Y. C.
Marietta Concrete Corporation, Marietta, Ohio
Stedman Foundry and Machine Co., Aurora, Ind.
Titlestad Corporation, Nicolay, New York City

FERTILIZER—Mixed

American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Davison Chemical Corporation, Baltimore, Md.
International Min. & Chem. Corp., Chicago, Ill.

FILLERS

Bradley & Baker, N. Y. C.

FISH SCRAP AND OIL

Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
Bradley & Baker, N. Y. C.
Jackle, Frank R., New York City
Woodward & Dickerson, Inc., Philadelphia, Pa.

FULLER'S EARTH

Ashcraft-Wilkinson Co., Atlanta, Ga.

FUNGICIDES

American Agricultural Chemical Co., N. Y. C.
Berkshire Chemicals, New York City
Pittsburgh Coke & Chemical Co., Agr. Chem. Div., Pittsburgh, Pa.
Tennessee Corp., Atlanta, Ga.

HERBICIDES

Diamond Alkali Co., Newark, N. J.
Lion Oil Company, El Dorado, Ark.
Monsanto Chemical Co., St. Louis, Mo.
Pittsburgh Coke & Chem. Co., Agr. Chem. Div., Pittsburgh, Pa.

HERBICIDES—Oils

Lion Oil Company, El Dorado, Ark.

HOPPERS & SPOUTS

Atlanta Utility Works, The, East Point, Ga.
Stedman Foundry and Machine Co., Aurora, Ind..

IMPORTERS, EXPORTERS

Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
Berkshire Chemicals, New York City
Woodward & Dickerson, Inc., Philadelphia, Pa.

INSECTICIDES

American Agricultural Chemical Co., N. Y. C.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Berkshire Chemicals, New York City
Diamond Alkali Co., Newark, N. J.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.
Pittsburgh Coke & Chem. Co., Agr. Chem. Div. Pittsburgh, Pa.
Shell Chem. Corp., Agr. Chem. Div., Denver, Colo.
U. S. Industrial Chemicals Co., New York City

IRON SULFATE

Tennessee Corp., Atlanta, Ga.

KAOLIN

Thomas Alabama Kaolin Co., Baltimore, Md.

LEAD ARSENATE

American Agricultural Chemical Co., N. Y. C.

LIMESTONE

American Agricultural Chemical Co., N. Y. C.
Ashcraft-Wilkinson Co., Atlanta, Ga.
National Lime & Stone Co., Findlay, Ohio

Buyers' Guide

MACHINERY—Acid Making and Handling
Atlanta Utility Works, The, East Point, Ga.
Chemical Construction Corp., New York City
Monarch Mfg. Works, Inc., Philadelphia, Pa.
Stedman Foundry and Machine Co., Aurora, Ind.

MACHINERY—Acidulating
Chemical Construction Corp., New York City

MACHINERY—Grinding and Pulverizing
Atlanta Utility Works, The, East Point, Ga.
Bradley Pulverizer Co., Allentown, Pa.
Poulsen Co., Los Angeles, Calif.
Stedman Foundry and Machine Co., Aurora, Ind.

MACHINERY—Material Handling
Atlanta Utility Works, The, East Point, Ga.
Clark Equipt. Co., Construction Mach. Div., Benton Harbor, Mich.
Hayward Company, The, New York City
Hough, The Frank G. Co., Libertyville, Ill.
Lessman Mfg. Co., Des Moines, Ia.
Link-Belt Co., Chicago, Ill.
Poulsen Co., Los Angeles, Calif.
Stedman Foundry and Machine Co., Aurora, Ind.

MACHINERY—Mixing, Screening and Bagging
Atlanta Utility Works, The, East Point, Ga.
Poulsen Co., Los Angeles, Calif.
Stedman Foundry and Machine Co., Aurora, Ind.

MACHINERY—Power Transmission
Link-Belt Co., Chicago, Ill.
Stedman Foundry and Machine Co., Aurora, Ind.

MACHINERY
Superphosphate Manufacturing
Atlanta Utility Works, The, East Point, Ga.
Link-Belt Co., Chicago, Ill.
Stedman Foundry and Machine Co., Aurora, Ind.

MAGNESIUM SULFATE
Berkshire Chemicals, New York City

MANGANESE SULFATE
Tennessee Corp., Atlanta, Ga.

MANURE SALTS
Potash Co. of America, Washington, D. C.

MINOR ELEMENTS
Tennessee Corporation, Atlanta, Ga.

MIXERS
Atlanta Utility Works, The, East Point, Ga.
Stedman Foundry and Machine Co., Aurora, Ind.

NITRATE OF POTASH
Berkshire Chemicals, New York City

NITRATE OF SODA
American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N. Y. C.
Nitrogen Div., Allied Chemical & Dye Corp., N.Y.C.
International Min. & Chem. Corp., Chicago, Ill.
Woodward & Dickerson, Inc., Philadelphia, Pa.

NITROGEN SOLUTIONS
Commercial Solvents Corporation, New York City
Nitrogen Div., Allied Chemical & Dye Corp., N.Y.C.
Lion Oil Company, El Dorado, Ark.
Phillips Chemical Co., Bartlesville, Okla.
Spencer Chemical Co., Kansas City, Mo.

NITROGEN MATERIALS—Organic
American Agricultual Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
Bradley & Baker, N. Y. C.
International Min. & Chem. Corp., Chicago, Ill.
Jackle, Frank R., New York City
Woodward & Dickerson, Inc., Philadelphia, Pa.

NOZZLES—Spray
Monarch Mfg. Works, Philadelphia, Pa.
Spraying Systems Co., Bellwood, Ill.

PARATHION
Ashcraft-Wilkinson Co., Atlanta, Ga.
Monsanto Chemical Co., St. Louis, Mo.
Pittsburgh Coke & Chem. Co., Agr. Chem. Div., Pittsburgh, Pa.

PENTACHLOROPHENOL
Monsanto Chemical Co., St. Louis, Mo.

PHOSPHATE ROCK
American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
Bradley & Baker, N. Y. C.
International Min. & Chem. Corp., Chicago, Ill.
Woodward & Dickerson, Inc., Philadelphia, Pa.

PHOSPHORIC ACID
American Agricultural Chemical Co., N. Y. C.
Monsanto Chemical Co., St. Louis, Mo.

PLANT CONSTRUCTION—Fertilizer and Acid
Atlanta Utility Works, The, East Point, Ga.
Chemical Construction Corp., New York City
General Industrial Development Corp., N. Y. C.
Link-Belt Co., Chicago, Ill.
Monsanto Chemical Co., St. Louis, Mo.
Stedman Foundry and Machine Co., Aurora, Ind.
Titlestad Corporation Nicolay, New York City

POTASH—Muriate
American Potash & Chemical Corp., N. Y. C.
Ashcraft-Wilkinson Co., (Duval Potash) Atlanta, Ga.
Baker & Bro., H. J., New York City
Bradley & Baker, N. Y. C.
Duval Sulphur & Potash Co., Houston, Tex.
International Min. & Chem. Corp., Chicago, Ill.
Potash Co. of America, Washington, D. C.
Southwest Potash Corporation, New York City
United States Potash Co., N. Y. C.

POTASH—Sulfate
American Potash & Chemical Corp., N. Y. C.
Baker & Bro., H. J., New York City
International Min. & Chem. Corp., Chicago, Ill.
Potash Co. of America, Washington, D. C.

POTASSIUM PHOSPHATE
Monsanto Chemical Co., St. Louis, Mo.

PRINTING PRESSES—Bag
Schmutz Mfg. Co., Louisville, Ky.

PYROPHYLLITE
Ashcraft-Wilkinson Co., Atlanta, Ga.
Pioneer Pyrophyllite Producers, Beverly Hills, Calif.

REPAIR PARTS AND CASTINGS
Atlanta Utility Works, The, East Point, Ga.
Stedman Foundry and Machine Co., Aurora, Ind.

SCALES—Including Automatic Baggers
Atlanta Utility Works, The, East Point, Ga.
Stedman Foundry and Machine Co., Aurora, Ind.

SCREENS
Atlanta Utility Works, The, East Point, Ga.
Stedman Foundry and Machine Co., Aurora, Ind.

SPRAYS
Monarch Mfg. Works, Inc., Philadelphia, Pa.
Spraying Systems Co., Bellwood, Ill.

STORAGE BUILDINGS
Butler Manufacturing Co., Kansas City, Mo.
Marietta Concrete Corporation, Marietta, Ohio

SULFATE OF AMMONIA
American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
Bradley & Baker, N. Y. C.
Jackle, Frank R., New York City
Lion Oil Co., El Dorado, Ark.
Nitrogen Div., Allied Chemical & Dye Corp., N.Y.C.
Phillips Chemical Co., Bartlesville, Okla.
Woodward & Dickerson, Inc., Philadelphia, Pa.

SULFATE OF POTASH—MAGNESIA
International Min. & Chem. Corp., Chicago, Ill.

SULFUR
Ashcraft-Wilkinson Co., Atlanta, Ga.
Texas Gulf Sulphur Co., New York City
Woodward & Dickerson, Inc., Philadelphia, Pa.

SULFUR—Dusting & Spraying
Ashcraft-Wilkinson Co., Atlanta, Ga.
U. S. Phosphoric Products Div., Tennessee Corp., Tampa, Fla.

SULFURIC ACID
American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N. Y. C.
International Min. & Chem. Corp., Chicago, Ill.
Lion Oil Company, El Dorado, Ark.
Monsanto Chemical Co., St. Louis, Mo.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.

SUPERPHOSPHATE
American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
Bradley & Baker, N. Y. C.
Davison Chemical Corporation, Baltimore, Md.
International Min. & Chem. Corp., Chicago, Ill.
Jackle, Frank R., New York City
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.
Woodward & Dickerson, Inc., Philadelphia, Pa.

SUPERPHOSPHATE—Concentrated
Armour Fertilizer Works, Atlanta, Ga.
Baker & Bro., H. J., New York City
Bradley & Baker, N. Y. C.
International Min. & Chem. Corp., Chicago, Ill.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.
Woodward & Dickerson, Inc., Philadelphia, Pa.

TALC
Ashcraft-Wilkinson Co., Atlanta, Ga.

TANKAGE
American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N. Y. C.
International Min. & Chem. Corp., Chicago, Ill.
Jackle, Frank R., New York City
Woodward & Dickerson, Inc., Philadelphia, Pa.

TEPP
Monsanto Chemical Co., St. Louis, Mo.

TOXAPHENE
Ashcraft-Wilkinson Co., Atlanta, Ga.
Pittsburgh Coke & Chem. Co., Agr., Chem. Div., Pittsburgh, Pa.

2, 4-D
Diamond Alkali Co., Newark, N. J.
Monsanto Chemical Co., St. Louis, Mo.
Pittsburgh Coke & Chem. Co., Agr. Chem. Div., Pittsburgh, Pa.

2, 4, 5-T
Diamond Alkali Co., Newark, N. J.
Monsanto Chemical Co., St. Louis, Mo.
Pittsburgh Coke & Chem. Co., Agr. Chem. Div., Pittsburgh, Pa.

UREA & UREA PRODUCTS
Baker & Bro., H. J., New York City
Bradley & Baker, N. Y. C.
Nitrogen Div., Allied Chemical & Dye Corp., N.Y.C

VALVES
Atlanta Utility Works, The, East Point, Ga.
Monarch Mfg. Works, Inc., Philadelphia, Pa.

ZINC SULFATE
Tennessee Corp., Atlanta, Ga.

Population, Food and Fibre

Last year the population of the United States increased by almost a quarter of a million people every month.

This rapid acceleration of our population growth calls for greater productivity of food and fibre.

Potash Company of America, around the clock producers of unexcelled Red Muriate of Potash, is assisting our farmers produce more on smaller acreage to meet this population growth.

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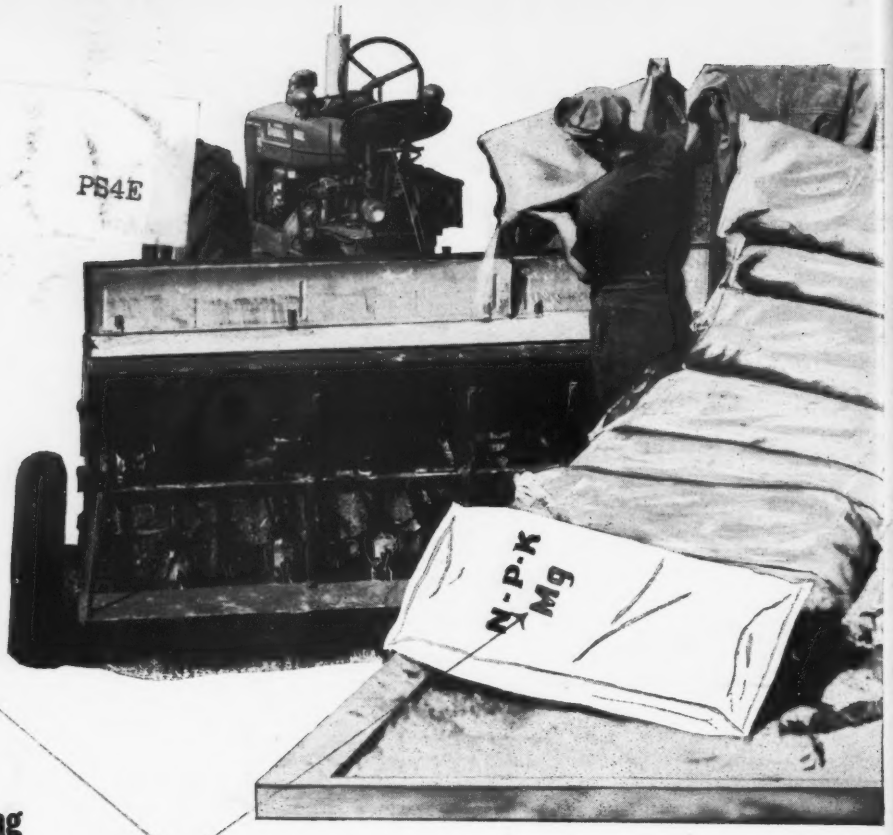

in

put it in the bag
put it on the bag

on

Sul-Po-Mag®

WATER-SOLUBLE ($K_2SO_4 \cdot 2MgSO_4$)
DOUBLE SULFATE OF POTASH-MAGNESIA

contains soluble magnesium—often called the fourth element!

Very often, the difference between profitable high yields and costly poor ones is the amount of soluble magnesium available to the crop. This is increasingly apparent each year as the lack of this vital nutrient becomes evident in more and more crop growing areas across the country. That's why soluble magnesium is often called the Fourth Plant Food Element . . . it's that important.

You can supply soluble magnesium economically and conveniently by including *Sul-Po-Mag* in your mixed fertilizers. You'll have a better product . . . one that dealers can merchandise more effectively . . . you'll have a fertilizer that will *make money* for farmers. And don't forget . . . results are what determine brand loyalty!

Sul-Po-Mag, produced only by the Potash Division of *International*, furnishes both magnesium and potash in sulfate form . . . properly balanced and water soluble for immediate availability to the plant. It is supplied in bulk for use in mixed fertilizers and bagged for direct application. So, include *Sul-Po-Mag* to supply soluble magnesium. Put it *in* the bag . . . and put it *on* the bag: Nitrogen, Phosphate, Potash, *Magnesium*.

MURIATE OF POTASH • SULFATE OF POTASH • SUL-PO-MAG

Mined and Refined at Carlsbad for Fertilizer Manufacturers

Potash Division

INTERNATIONAL MINERALS & CHEMICAL CORPORATION

General Offices: 20 North Wacker Drive, Chicago 6